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features in this issue...

Intramammary Use of Hydrocortisone in Mastitis

Advances Made in Swine Practice, Part II

Poulardization of New Hampshire Pullets

Applications of Gastrointestinal Physiology to Small Animal Medicine

Factors in Creating and Dissolving a Partnership

Clinical Uses of Prednisone in Dogs

Implants for Defective Cartilages in Cropped Ears

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Influence of Disease Epidemics

It appears that there may be considerable truth in the assertion that disease epidemics influence downward consumer demand for flesh of animals in which disease is reported in epidemic proportions.

The example of the present situation regarding low prices paid growers of market swine may be pointed out as an example of consumer reaction to publicity given vesicular exanthema in swine, garbage cooking regulations written into state laws, and incidence of trichinosis in pork from garbage-fed animals.

Certainly other factors are operative and responsible for the lowest price paid growers of market hogs in 13 years. These include; larger supplies than anticipated, lowered demands for animal fats, lack of quality of cured pork products, and others. Nevertheless, there appears to be unmistakable evidence that consumers of meat involuntarily react against a product derived from animals which have suffered serious and widespread disease that has concerned livestock authorities, been subject of debate in legislative halls, and incidentally has been associated with a public health menace.

Revolutionary changes are being made in the hog lot following recommendations of industry leaders on husbandry practices designed to produce pork products consumers demand. These begin with breeding for superior prime cuts, higher meat lower fat of all cuts, and most desired size and weight. Increase in demand for imported, cured, pork cuts also have concerned growers. These possess taste quality superior to much offered by American packers, in addition to size, fat content and cover, et cetera.

The lesson of influence of disease of animals on subsequent demand for their flesh is, however, real and foreboding. In this is emphasized again the necessity for skilled, professional service to all domestic livestock from the standpoint of its value to the industry's economy. Methods of disease control and prevention other than those carefully planned and executed might be expected to be followed by reduced demand, oversupplies, and disastrous losses.

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Intramammary Use Of Hydrocortisone In Mastitis: A Preliminary Report

R. F. VIGUE, D.V.M., Springvale, Maine

ADRENAL cortical steroids, in combination with antibiotics, were used intramammary for the treatment of acute mastitis by the writer for the first time in mid-1952. Results of that experience were encouraging, but the meager supplies and the high cost of steroids, at that time, prohibited extensive use. This prompted the request directed to various pharmaceutical houses, for experimental supplies of hormones in combination with antibiotics for further evaluation in acute mastitis. While the value of the local use of cortisone and hydrocortisone in dermatological therapy was well established at that time,[1] pharmaceutical firms were considerably reluctant in supplying preparations containing antibiotics and hormones for the treatment of mastitis. This may be understood readily if one will but realize that it was only two years earlier (1950), that Thorn of the Harvard Medical School instilled hydrocortisone directly into a rheumatoid arthritic joint. His results were dramatic. A prompt, local alleviation of pain and swelling was noted, and this from only 10 mg. of hydrocortisone[2]. On the basis of this observation, and other similar ones soon afterward, [19,20] and the published results with the local use of the hormones in a variety of skin diseases in man, it certainly appeared that further investigation of the use of the steroids in the udder was justified. Further trials in this respect soon revealed that hydrocortisone possessed a much greater anti-inflammatory action than did cortisone.

Materials used for these studies were supplied through the courtesy of Dr. Laurent Michaud, Merck & Co., Inc.; Dr. H. L. Easterbrook, Lederle Laboratories; Dr. John T. Groel, E. R. Squibb & Sons; and Dr. I. M. Siegel, U. S. Chemical Co., Inc. Figures 1 to 3 were supplied through the kindness of Mr. Herb Kinnear, Babson Bros. Co., Chicago.

Mechanism of Action

It is not our intention to attempt a review of the massive literature on the antiphlogistic action of the adrenal cortical steroids. However, a better understanding of this effect can be obtained by citing a few of the earlier studies aimed at explaining just how the hormones operate. In one of the first studies, the skin of rabbits was scarified and croton oil rubbed into the wound. In rabbits receiving cortisone the inflammatory reaction was reduced. Formation of fibrin and subsequent development of edema were depressed and the ultimate development of sloughing was markedly decreased; indicating that effects of cortisone persisted for some time[3].

In further studies injection of irritants such as turpentine, various toxins, pathogenic organisms, acids, et cetera, into animals receiving cortisone indicated that the inflammatory reaction was reduced significantly as well as the amount of edema and pain[4,5,6]. Of great clinical interest was the finding that cortisone and hydrocortisone were capable of reducing the subsequent damage resulting from these various stress factors. Moreover, these early studies also indicated that the pain threshold was increased by the steroids[5].

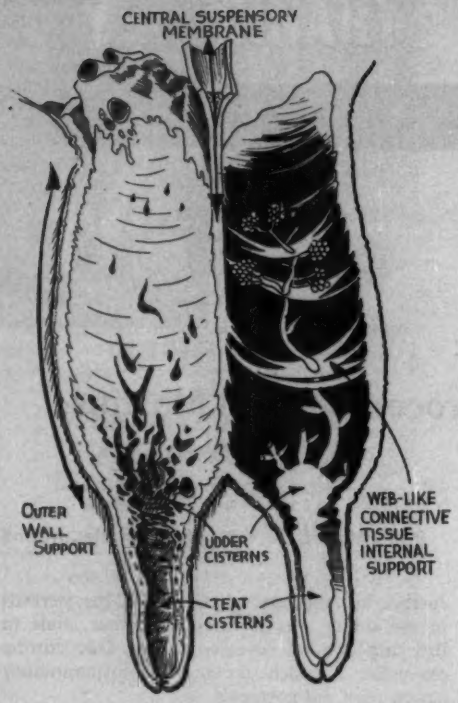

Fig. 1. Cross section of the udder through rear teats. Note how the single duct with its secretory cells on the end is entirely supported in place by connective tissue in the right quarter. Connective tissue constitutes the medium supporting and surrounding the elements of all other tissues. Connective tissue is now recognized as the primary site for all types of inflammation.

It was pointed out clearly in these early studies on the anti-inflammatory action of the steroids that they do not act on the causative agents of disease; therefore, they should not be considered disease specific. They do not kill germs or "cure" disease whose symptoms they suppress; they appear, instead, to provide susceptible tissue cells with a shield-like buffer against various irritants[7,18]. To use a figure of speech, they increase the "insult-threshold" of the cells to obnoxious stimuli. The tissue reactions, which the steroids suppress, not only provide most of the symptoms of inflammatory diseases, such as mastitis, but, if they are long continued, lead to proliferative and reparative histological changes which result in scar-tissue formation and in the case of udder parenchyma, a consequent reduction in the gland's ability to secrete milk.

Davidson has stated that the connective tissue is the major site of all inflammatory processes. Cortisone locally exerts a profound influence upon all cellular structures and the biochemical behavior of the connective tissue components. Under the influence of cortisone or hydrocortisone various aspects of inflammation, including proliferation of fibroblasts, cellular infiltration, capillary permeability formation and changes in physical properties of collagen are reduced, inhibited, or controlled, probably indirectly through a number of enzyme systems[9]. It has been suggested that the anti-inflammatory action of hormones also relieves conditions in the tissues which constitute a stimulus to pain sensation[6].

Suppression of the phenomenon of local tissue reactivity by the steroids has been found to actually accelerate healing under certain conditions[7]. Where pathogenic organisms are present, however, such as acute mastitis, it should be borne in mind that hormones decrease the phagocytic activity of the neutrophilic leukocytes thus lowering natural defense mechanisms. Therefore, while the cortisones suppress inflammation, disease-causing bacteria accelerate their proliferation. It has been our experience, that the use of cortisone or hydrocortisone in infectious diseases without adequate biotherapy is not only poor practice, but hazardous. Dosages of 1 to 1.5 gm. of hydrocortisone intramuscularly in cows with retained placenta results in the prompt expulsion of the membranes. However, the incidence of endometritis is high following this therapy and two cases of fatal metritis have been observed as sequelae to this procedure. On the other hand, the simultaneous administration of hydrocortisone in similar doses with adequate amounts of antimicrobials provides a safe and effective method of handling retained placenta in cattle. The treatment has been found to be satisfactory in handling the problem of retained placenta in sale animals.

Concurrent administration of the hormones with broad-spectrum antibiotics is now accepted as constituting rational therapy[10,11,12,13]. Results following the use of hydrocortisone as an adjunct to biotherapy has been found to be life saving in many instances[15,16]. From our studies, we feel that the addition of the steroids, particularly hydrocortisone, to adequate amounts of antimicrobials for the treatment of acute mastitis has shortened the course of this inflammatory disease and resulted in the more prompt clearing up of milk. To be of any value the steroids must be employed early. Selye[17] has found that there is a critical period during which inflammation responds best to a minimum amount of steroids. We have found

them to be of no value whatsoever in chronic mastitis; they must be administered before irreversible structural changes occur.

Dosages of the Steroids

The amount of cortisone used in the udder has varied from 10 mg. to 1 gm. per quarter injected after each milking until inflammation subsides. As was indicated earlier, hydrocortisone was found to be more effective than cortisone in the early phases of our studies so that use of the latter was discontinued. The amount of hydrocortisone has varied from 15 mg. to 1 gm. per quarter. The higher doses levels are not, as yet, economically practical

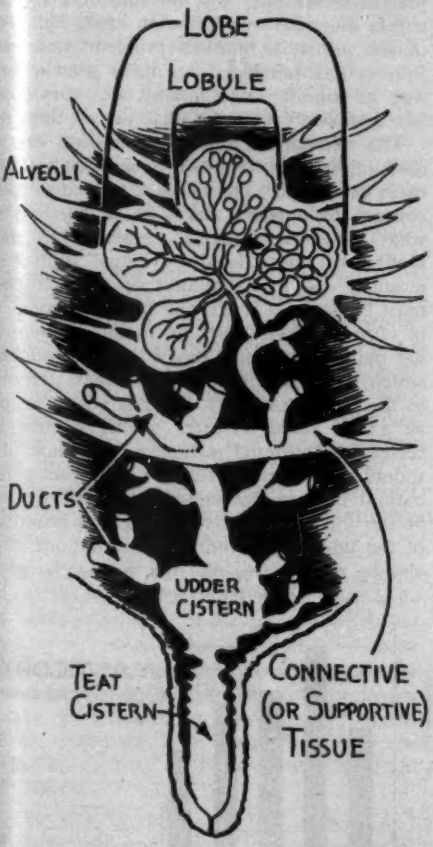

Fig. 2. Each quarter consists of many lobes, each of which contains smaller lobules, in turn containing many alveoli. The teat is connected by these millions of alveoli through an intricate duct system supported throughout by connective tissue. This tissue plays an important role in the nutrition of the secretory cells. Hydrocortisone exerts its anti-inflammatory action primarily on the elements of connective tissue.

in routine dairy cattle practice. We have elected the dose levels of 50 to 100 mg. as optimal at the present time. At this stage of our studies we are unable to state dogmatically which is superior, hydrocortisone acetate or hydrocortisone free alcohol. With respect to fluorohydrocortisone, a halogen derivative of hydrocortisone, amounts varying from 1 mg. to 25 mg. have been employed. No benefit has been recorded with amounts less than 5 mg. Dosages from 10 to 25 mg. have given promising results. We have not used nearly as much of this hormone as the parent one, so that further observations may modify our present opinion. Supplies of prednisone have just been made available.

Experiences with Masticort®

Masticort is a potent mastitis formulation containing 500,000 units penicillin, 0.5 gm. dihydrostreptomycin, 1000 mg. sulfamerazine, 1000 mg. sulfathiazole and 50 mg. hydrocortisone in 28 cc. of readily diffusible, water-soluble base incorporating chemicals which cause a lowering of surface tension between the added medicants and the various mechanical blocking agents that are encountered in the dichotomous pathways of the infected udder. The same preparation also was supplied without hydrocortisone. One preparation was labeled "A" (without hydrocortisone); the other labeled "B" (with hydrocortisone). Neither the writer nor the dairymen cooperating in this study knew this information until the termination of investigations. Only cases of acute local mastitis were treated; no other therapy being used except local massages of the udder following infusion of the compounds. The quarters were treated following each milking and generally treatments were continued until the quarter returned to normal or until it was evident that no response to treatment would occur. In the event that one cow had two swollen quarters at the same time, each quarter received a different preparation; otherwise alternate cases received the same medication. By local mastitis, we mean cases which showed no temperature or other signs of systematic involvement. Presumably, if systemic medication had also been administered, the results would have been quite different but this would have made fair evaluation of hydrocortisone difficult. Two large herds were used in the study milking a total number of 227 cows. A total of 188 quarters were treated

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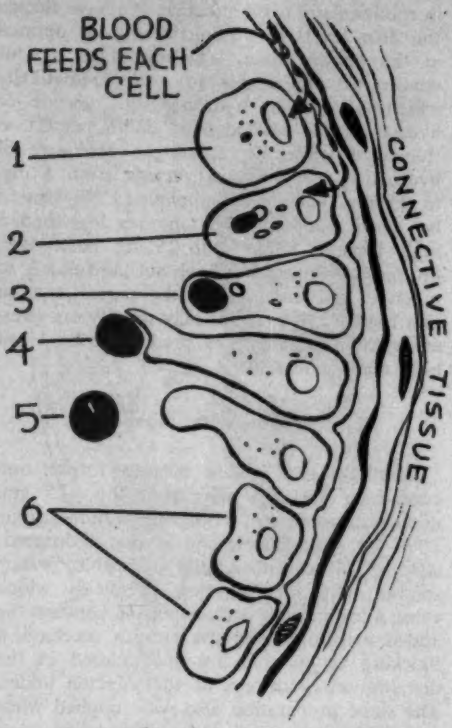

Fig. 3. Six stages of milk secretion: milk forming substances enter from the blood in stage 1, fat globule begins to form in 2, gets larger in 3 and 4 and completely breaks away in 5. Stage 6 is indicated by flattening of the cells as pressure builds up in the alveolus. All substances which the secretory cells receive from the blood, and all products of metabolism and water which they turn over to the blood and lymph must pass through a layer of connective tissue. The latter tissue forms the primary arena of inflammatory reactions where the antiphlogistic effects of hydrocortisone is most marked.

from March, 1954 to August, 1955. Results are presented in figure 4.

Comments

The treatment of acute mastitis still presents a challenge to practitioners. Although milk samples can be collected for bacteriological and antibiotic sensitivity tests, results are not available for 24 hours or more. Consequently the only way of handling the problem is prompt and adequate treatment, even though the causative organism has not as yet been determined. While simultaneous use of hydrocortisone and biochemotherapy, if used early, offers some therapeutic advantages over present treatments, it is no substitute for accurate diagnosis and common sense appraisal of the particular mastitis problem presented. Present day miracle drugs have gone a long way to modify our thinking, but they have not completely obviated that art of thinking.

The widespread and indiscriminate use of antibiotics in the treatment of mastitis has lead many present day practitioners to change from concern to outright alarm in anticipation of what increasing bacterial resistance to antibiotics will mean in the eventual control of mastitis. Adequate amounts of antimicrobials must be used. It is difficult for us to compare *in vitro* sensitivity tests on antibiotics regarding optimal concentration with the conditions which we obtain in such a complex structure as the udder. A cow's udder is not as simple as a test tube. Greater attention must be focused on bacterial resistance. The host also should receive greater study, with respect to her natural defense mechanism and how we can bolster this protective system against infections of the udder. Environmental conditions must also be re-evaluated and the managerial prac-

(*Continued on page 721*)

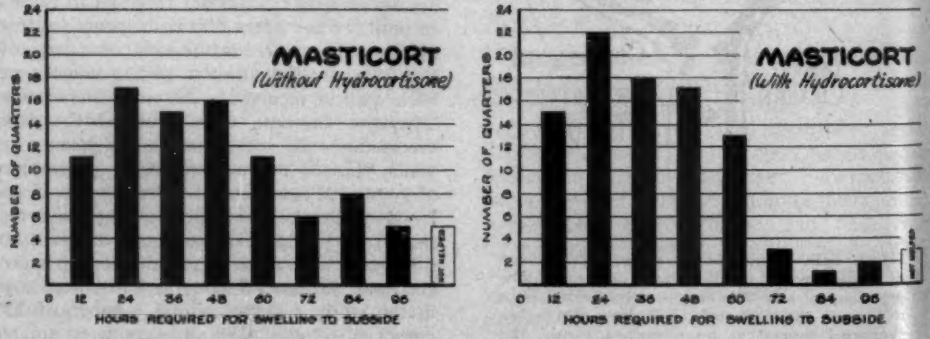

Fig. 4. Results following use of a well formulated antibiotic-sulfonamide aqueous suspension containing a surfactant (polyoxyethylene sorbital monooleate) without hydrocortisone and with hydrocortisone in the treatment of local mastitis. The time required for the inflammation to subside was significantly reduced by addition of hydrocortisone.

Advances Made In Swine Practice

H. C. SMITH,* D.V.M., Sioux City, Iowa

Part II: Swine Erysipelas

In this article, Part II of the series begun in the November issue of VETERINARY MEDICINE, the author deals with background material concerning swine erysipelas and brings up-to-date information pertaining to this important disease of swine.

Swine erysipelas has a special character of its own which has made necessary control procedures differing in many respects from those proved successful in other swine diseases. Problems of diffferential diagnosis, susceptibility of various classes of swine, efficacy of immunizing procedures, and others have been subjects of study for over 30 years. During this period and up to recent months, recommendations for better control have been proposed based on advanced studies and new facts revealed by research.

Part III of this series by Doctor Smith will appear in an early issue.

Annual Reports of the BAI numbered 12 and 13 (1897),[1] noted that swine erysipelas was observed in 1885, 1888, and 1893. Theobald Smith, in 1855, isolated the organism from the spleen of a pig. In 1920, C. Tenbroech[2] isolated the organism from the tonsils five different times. G. T. Creech[3] also isolated the bacillus from many cases of urticaria. Attempts to infect swine with recovered organisms failed; however, guinea pigs, pigeons, rabbits, and mice were infected readily. He concluded that the urticaria or "diamond skin disease" which existed at that time was a mild, chronic form of erysipelas.

Kinsley[4] called attention to the work of Creech with diamond skin disease. Kinsley stated that, if the acute septicemic form of swine erysipelas has occurred in the United States, it has not been recognized or at least not reported. The disease up to that time had been of little consequence. He describes the organism, symptoms, and lesions as they occur in Europe. The "Lorenz" method of immunization was used abroad. It consisted of the use of hyperimmune serum and virulent cultures.

Giltner[5] found that erysipelas was a generalized bacteremia and that it produced sudden death in swine. In the same year, A. R. Ward, *et al.*[6] isolated the organism from cases of swine arthritis. During this period, erysipelas was beginning to make headway in droves of pigs, particularly in the states of South Dakota, Nebraska, and Iowa. It was not recognized then as a disease entity by many practitioners.

In 1923, J. W. Parker, Ashe Lockhart, and J. D. Ray[7] reported on the laboratory examination of tissues from 110 cases of suspected erysipelas. Twenty had skin lesions only; 20 joint lesions only; 19 exhibited both skin and joint involvement; 16 had skin and gland lesions; 13 joint and gland lesions and in 22 cases skin, joint, and gland lesions were present. By 1928 swine erysipelas was recognized in the United States as diamond skin disease[8] and had been identified in the states of Missouri, Kansas, California, South Dakota, Iowa, and Illinois. Control measures consisted of isolation of affected animals. Autogenous bacterins made from the isolated organisms apparently had given satisfactory results. The disease at this time was not considered serious. It might occur as a complication of other swine diseases in which case losses may be large. Doctor Kinsley[8] stated, "It is not the intention of this article to imply that swine erysipelas in a virulent form exists in the United States, but in view of the published findings of the BAI, it appears timely to discuss this disease briefly at this time."

Diagnosis of Erysipelas

During the summer of 1927, an unrecognized disease in swine was occurring in the practice of A. A. Fosterman of Utica, So. Dak. In some instances, the condition was diagnosed as hemorrhagic septicemia due to the septicemic lesions and rapid deaths in some herds. During the following year, the disease became prevalent; taking on more virulent form. Heavy losses occurred in spite of administration of hog cholera antiserums, bacterins, and hemorrhagic septicemia aggression.

Many practitioners were called in to see this new swine disease. Among them was J.

*Allied Laboratories, Sioux City, Ia. President, Iowa Veterinary Medical Association, 1955.

B. Taylor[9] of the South Dakota Agricultural College at Brookings, So. Dak. In May 1931, he established the fact definitely that the disease was erysipelas by isolation of the organism.

During the summers of 1930 and 1931, Fosterman used all of the available erysipelas antiserum that could be obtained in this country with fairly satisfactory results.

Due to the transportation of swine from South Dakota by truck into Nebraska and Iowa through community sales barns, the disease soon became well seeded over a large area. State and commercial diagnostic laboratories were called upon frequently to render help in arriving at an accurate diagnosis. Credit for this assistance should be given to T. W. Munce and L. E. Willey of Sioux City, Ia.; Frank Breed of Lincoln, Nebr., and the writer, then at Fort Dodge, Ia.

Up to this time, few veterinarians used rubber gloves when conducting postmortem examinations on swine, and as a result swine erysipelas infection became common among veterinarians. The lesions (usually on the hands) were painful, hot, red, and swollen. Physicians were not in a position to aid. The supply of erysipelas serum was limited, although a small amount of concentrated serum was available. At that time, it was recommended that hands be bathed in the serum.

Tissue material from four suckling pigs and a sow was referred to Dr. Frank Breed of Lincoln, Nebr. by Doctor Fosterman for bacteriological examination. Breed[10] isolated erysipelas organisms from the tissues submitted. At that time, as it sometimes is now, it was difficult to differentiate acute swine erysipelas from hog cholera, especially in unvaccinated herds due to the similarity of lesions of erysipelas and cholera. Doctor Breed suggested that the practitioners avail themselves of the services rendered them by diagnostic laboratories.

Drs. T. W. Munce and L. E. Willey (1932)[11] reported on their work on herds of swine in South Dakota. This was the first report on actual field cases. From observations, they concluded that the condition occurred more often in the summer and late fall and remained dormant during the winter months, only to recur in succeeding pig crops, indicating that infection was carried over on contaminated farms or that recovered swine became carriers.

All ages of swine were affected. In some herds, all animals died. The course of the disease ranged from sudden deaths to rather long periods of recovery. In some herds, arthritis and uthriftiness were common sequelae. This disease had spread to at least 17 states by 1933. As would be expected, it was observed most frequently in what were known as the corn-hog states.

Stange[12] warned Iowa veterinarians that they must make a correct diagnosis between hog cholera and erysipelas. A bacteriological examination would be necessary in many cases where typical lesions were absent. He stated, "The presence of swine erysipelas is going to complicate seriously our already difficult swine disease situation." He predicted that,

From VETERINARY MEDICINE, March 1941, pg. 158.

A portion of the first herd of swine in Iowa to be given the culture-serum simultaneous anti-swine erysipelas vaccination (Nov. 4, 1940). Note that the pig in the foreground is relieving his hind feet by sitting on the self-feeder support and is standing on his toes in front. Soreness of the pads is of common occurrence in swine erysipelas. Enlargement of the left hock may be noted in the mostly white pig just beyond. Others in the group had enlarged, painful joints.

Photo courtesy Dr. J. W. Giffee.
Skin form of swine erysipelas.

if general immunization procedures became necessary, it would mean increased cost of pork production and that veterinarians would require experience and judgment in differential diagnosis which, if lacking, would result in many disastrous mistakes. He advocated the use of erysipelas antiserum because of its therapeutic value and because of favorable results following its use.

Agglutination Tests

Culturing the disease organism from swine tissues has been the most satisfactory method of diagnosis. Postmortem lesions are unreliable. Administration of large amounts of antisera to acutely ill swine, exhibiting high temperatures, may result in a rapid recovery as shown by a fall in body temperature and a return of appetite. This method of diagnosing swine erysipelas has been used extensively in the hog-producing areas.

H. W. Schoening, G. T. Creech, and C. G. Gray[14] produced antigens using smooth type swine erysipelas organisms. Agglutinins were not found in a few cases of diamond skin diseases. They found that a reaction of 1:25 indicated an exposure to infection, past, or present. Agglutinins were found in the blood stream of diseased animals two to five days after symptoms were observed. Best results were obtained in animals showing joint involvement.

Karlson and McNutt[15] developed a microscopic agglutination test which gave improved results. It was a modified Widal test. All these tests were used by many laboratories in all parts of the United States. One should say they served their usefulness in the early days. They are not now used extensively.

A masterful paper was presented by Dr. Frank Breed[16] before the A.V.M.A. meeting in Chicago, Ill., in 1933. At that time he differentiated the lesions found in hog cholera, infectious enteritis, and swine erysipelas. He also predicted, "Swine erysipelas in the United States is not to be considered as occurring in the form of an epizootic such as cholera. The involved areas, although they are increasing in number and extent, are still more or less enzootic in character, but the precautions necessary to the control of highly infectious diseases must be exercised, or within a comparatively short time swine erysipelas will be so prevalent and spread over such large areas that it will become one of the epizootic diseases of swine in America." This prediction has come true. He warned against the use of live erysipelas organisms with serum as an active immunizing agent for fear of setting up additional foci of infection.

Swine erysipelas spread so rapidly in the early 30's that it would have been impossible to have stopped its spread by the use of serum alone. Rapid transportation of swine, especially by truck, resulted in new areas of infection appearing daily.

Harrington, (1933)[17] reported on his field cases that occurred in 1932 in South Dakota. Over 100 farm herds under his care had experienced losses from the disease. He cautioned veterinarians first to see to it that the herds were vaccinated for hog cholera because that still was the number one disease of swine.

Photo courtesy Dr. G. T. Creech.
Swollen joints and evidence of pain on movement are commonly associated with swine erysipelas.

Erysipelas serum, if it was available, could be given at the same time as the hog cholera immunization. It was of considerable value in the acute septicemic forms of the disease, but it had little value for relieving chronic disease manifestations.

Attempts to transmit the disease in the laboratory were conducted by Creech in 1933[18]. At that time, as it is now, it was transmitted from pig to pig under farm conditions and held over from year to year on the same farm. American investigators had found that the disease could not be reproduced experimentally in its typical form with certainty, or any degree of regularity, regardless of the material or methods used in exposure tests. Up to this time, it was thought that infection most frequently occurs through the intestinal tract, although in one feeding experiment only one of four pigs became infected by feeding cultures. The finding of large numbers of the organism in the urine indicated that the urinary tract is probably one of the principal avenues by which organisms are widely disseminated; particularly in the later stages of the disease.

During the years 1935 and 1936, there was a marked decrease in the number of cases of swine erysipelas due to two factors: A decrease in the number of swine herds, and the extremely hot and dry weather. Many apparently infected herds were moved from South Dakota and Nebraska into Iowa, Minnesota, and eastward because the disease was becoming more prevalent following the drouth in the Middle West. We had suffered a shortage of animal feeds and there had been a considerable movement of swine to areas where the food supply was more abundant.

Since chronic carriers may not appear to be sick at the time of transportation or purchase, they may infect the soil and thus establish new foci of infection.

We are quite sure that during this period many swine were sold through community sales as feeder pigs from drouth area farms and were purchased by unsuspecting buyers on the promise that the unthrifty condition of the animals was due to a lack of food and not to any disease condition.

Up to this time, affected swine were being treated with erysipelas serum alone; however, the simultaneous method of immunization was being advocated.

Vaccination Procedures

Most of the content of Nebraska Research Bulletin 84 (Van Es and McGrath)[19] deals with the disease in other countries. At the time of its publication, as it is today, it was one of the classics on swine erysipelas. These two veterinarians had seen a great many cases in Nebraska, and since Doctor Van Es had seen the disease in many sections of Europe, he had first hand knowledge. Since the disease in the Middle West became serious in the 30's, perhaps this prompted the authors to state that, "the disorder declares itself only when an exalted virulence of its microbic course is synchronous with a lowered resistance of swine. They may come about under the influence of the increased temperature of the warmer season, when morbidity is always higher."

During 1936 and 1937, Van Es and McGrath[19] did considerable field work with practitioners in Nebraska with serum and culture. They prepared their own vaccine for use in that state only. It was the first incidence of the immunization of swine in the United States by the serum-culture method. Later the Bureau set up its own laboratory at Lincoln, where they produced culture for use by practitioners under certain specified conditions. The request for culture was sent through the office of the state veterinarian and the federal veterinarian in the respective states. After the use of the culture and serum on the herd, the veterinarian reported the results of the work.

An additional fact was established by E. F. Waller[22] who stated that young swine, "three-day-old pigs", may also develop erysipelas. Van Es and McGrath[19] had shown previously that susceptibility is least marked in the age group under three months, although older animals may become affected. State and federal regulatory officials were urged to institute rules and regulations to prevent the spread and dissemination of the disease because swine erysipelas was proving to be more difficult to control than hog cholera, because infection persisted for an indefinite period.

The Texas Livestock Sanitary Commissioner was the first official to quarantine a county because of the presence of swine erysipelas. Neuces County, Tex., was placed under quarantine on March 5, 1938, until all of the swine on eight premises were disposed of properly.

Again in 1940, T. W. Munce[20] reported that by this time the disease had spread to 39 states. The ability of apparently healthy swine to carry the infection to susceptible animals and to noninfected premises was one of the

most discouraging problems connected with attempts to control the disease by regulatory measures. Repeated injections of serum were not practical, and were costly. Doctor Munce called attention to the fact that hog cholera was still the number one swine disease in the United States. When sickness appears in a herd, the animals should be protected against hog cholera. In the matter of arriving at an accurate diagnosis of erysipelas, tissues from dead swine should be sent to a diagnostic laboratory for isolation of the organism.

In view of the good results following extensively supervised use of the serum-culture method of erysipelas immunization in Nebraska for three years, state and federal officials agreed that experimental application of the method be permitted in Iowa. The culture was furnished by the Bureau laboratory in Lincoln, free of charge, provided a detailed report of observations following its use was sent to the state official. It is interesting to note that the culture was good for only eight days.

At the U. S. Livestock Sanitary Association meeting in Chicago in 1942, C. G. Grey[28] made the statement that, "wherever hogs are raised, we are likely to find swine erysipelas." In the states outside a portion of the Corn Belt, the disease, at that time, was limited to occasional cases. At the same meeting, J. E. Peterman, also of Lincoln, stated that the dose of serum largely depends upon the circumstances prevailing in the herd, and the stages of the disease during which serum is administered. If the entire herd has been affected with acute erysipelas for two or three days or more, considerable damage already has taken place. A large dose of serum is of no more value than a small dose.

H. W. Schoening remarked that the work of simultaneous treatment for erysipelas as started by Van Es in 1938 was taken over by the BAI in 1940. The demand for the vaccine increased so rapidly that in 1942 the BAI made arrangements for commercial laboratories to prepare the vaccine under a limited license. Vaccine was to be known as *Erysipelothrix rhusiopathiae* vaccine. At that time (1942)[29] the states of Nebraska, Iowa, South Dakota, Illinois and Missouri were designated as states in the cooperative program.

Van Es cautioned veterinarians that vaccine should be used on farms where the disease has made its appearance or where pigs of unknown origin are introduced. On farms where the infection is actually found, there may be no harm resulting from the use of

Swine erysipelas heart. Illustrating the typical growths produced by the erysipelas organism on the heart valves. In acute cases these lesions are not found. In baby pigs similar growths are produced by Streptococcus viridans.

live-culture method of immunization. Vaccine should not be used on farms where the disease does not exist because of the possibility of establishing new centers of infection.

The incidence of swine erysipelas occurring in herds after serum and culture vaccination amounted to 0.14% of the total number vaccinated[24]. Survey of nonvaccinated herds of the same area revealed an increased herd incidence from 38% in 1938 to 67% in 1942. By 1947 the serum-culture method had been extended to 11 states with satisfactory results. All serial lots of hog cholera virus were being tested by commercial firms producing virus and also by the BAI for the presence of the erysipelas organism and, if found, the entire serial was destroyed.

In 1946 and 1947, commercial firms began the manufacture of dessicated erysipelas vaccine. It was expected to be a much improved vaccine due to the extended viability of the organisms and a more uniform number of erysipelas bacteria. The scientific staffs of the commercial firms knew that, during the process of desiccation, there would be a certain number of bacterial cells killed or destroyed by the process; therefore, additional bacteria were added to compensate for the loss due to the process. This was real advancement because, up to this time, all erysipelas vaccine was in the liquid stage and the viability may not have always been constant due, in part, to the changes in temperature to which it was exposed during shipment and transportation to the country.

Treatment

During 1948, W. A. Aitken,[25] then of Merrill, Ia., began the use of penicillin and serum

in the treatment of acute cases of erysipelas. The results were satisfactory. The dose of penicillin was 2,000 to 3,000 units per pound of body weight. At first he used the antibiotic and serum, injecting them separately. Later, he dissolved penicillin in the serum and administered as one injection. This method is in common usage today.

Desiccated vaccine came into wide use by 1950. It had proved to be fully virulent after one year from production. This was another step in the advancement of swine practice. However, the incidence of infection in swine herds continued to grow to such a degree that the disease ranked next in importance to hog cholera. Investigators working with erysipelas were handicapped because they were unable to reproduce the disease in swine with any degree of regularity. This had been one of the problems with which early workers were confronted.

Reproduction of Disease

Work was begun by the Bureau in 1948 on procedures for artificial inoculation by introducing the virulent American strains of organisms into scarified areas of the skin. Results were reported[37] in 1950 as follows: "In the susceptible animal, lesions appear along the scarified line within 24 hours and consist of either individual, diamond-shaped, reddened, raised areas, which later join into larger ones, or a continuous reddened, raised area similar to the welt caused by a whip. Pigs vaccinated by the serum-culture method did not develop lesions, indicating immunity."

Work of scarification of the skin and intradermal injection of culture was continued by Shuman[38]. He produced the urticarial form of the disease. Of 33 strains of the organism tested for their ability to induce skin reactions, all but three were satisfactory. After the skin reaction disappeared, animals were immune.

During 1952[39] over 4,000,000 pigs were vaccinated. However, losses to baby pigs continued to increase in spite of prophylactic measures. Many practicing veterinarians had noticed losses in herds of small pigs that had been vaccinated when they were two to three days of age. Nevertheless, on some farms it was necessary to vaccinate at that age. We began losing faith in our method of vaccination. Some of the answers became clear after the publication of the Bureau report for 1953[40]. In this was shown that baby pig vaccination did not protect to marketable age. Baby pigs kept on infected premises were vaccinated and then exposed by the scarification method which indicated that 37% of them were protected for eight to ten weeks; 13% were protected for only three months. This information was needed by practitioners, as a change in the method was necessary to protect baby pigs during at least the first two weeks of their lives, particularly those raised on farms where infection existed.

Further work revealed that, if gilts were vaccinated with serum and culture before they were bred, pigs were also protected up to six weeks of age. During the past two years, many practitioners are taking advantage of this information and are putting this method of immunization into practical use.

Shuman and Schoening[41] concluded that swine erysipelas may manifest itself by varying degrees of severity or may even go unrecognized. Later Shuman[42] recommended that the dosage of erysipelas culture be 0.5 cc. and 3 cc. of antiserum for the vaccination of weanling pigs. Their experiments demonstrated that there was an inconsistency in the receptiveness and/or immunizing response to vaccination on an individual as well as a litter basis. There was no explanation for this finding.

In 1954, McNutt[43] stated that the disease appears to be one that can not be eradicated due, in part, to the wide host range which allows for propagation of the organism in nature, even if it could be eradicated from one or more species. At the present time, known susceptible species are swine, man, dogs, sheep, cattle, mice, rabbits, fish, lobsters, turkeys, pigeons, seals, chickens, geese, ducks, mud hens, pheasants, parrots, and quail. In spite of the infection in the above named species as possible modes of spreading the organism, Doctor McNutt believes that the main source of spread of the disease to new herds has been the introduction of infected carrier swine.

The writer believes that McNutt's opinions are based on the fact that normal swine may be constant carriers of the infection in the tissues of the tonsils, bronchi, and intestinal tract and may give off the infection at any time.

Improved Vaccines

Ake Nordberg[44] made a vaccine prepared with an avirulent strain of erysipelas which was effective in producing immunity when injected into mice. When 10 cc. of a bouillon culture was injected into pigs, no ill effects were elicited.

According to Hrusha,[45] vaccination against swine erysipelas with bouillon culture attenuated by the addition of digitonine and saponine confers immunity to the swine and rabbits. Without these glucosides, the same dose is lethal.

A Bureau report[46] shows that a culture of the swine erysipelas organism was cultivated in nine to 11-day-old chick embryos for 16 serial passages. A considerable increase in virulence of the organism was acquired after several passages. Vaccines prepared with suspensions of chick-embryo culture inactivated by both phenol and formalin were found to be harmless for pigeons but failed to induce immunity in any of the vaccinated birds when exposed to virulent cultures.

Sandstet and Lehnert[47] attenuated the erysipelas organism by cultivation of trypaflavine agar. They vaccinated 15,000 pigs, of which the results on 8,000 were studied. From 15 days to three months, none of the vaccinated animals died, notwithstanding that numerous cases of swine erysipelas were observed in nonvaccinated animals. Muromtsev[48] prepared an anaculture from virulent strains of erysipelas. Of the large numbers of swine vaccinated that year, 0.73% contracted the disease shortly after vaccination. The immunity disappeared four months after vaccination.

During the spring and summer of 1947, the Staub vaccine[49] was used for the immunization of swine in Poland. The Staub vaccine appeared to be an effective immunizing agent. Immunity developed within two weeks and persisted for six months or more. Pigs less than three months of age did not develop a satisfactory immunity. Fresh vaccine was necessary. Vaccine older than 14 days was not a satisfactory immunizing agent.

Of particular interest to American veterinarians is information contained in a paper by Martin M. Kaplan[50]. Swine erysipelas antiserum obtained from hyperimmunized sheep is used in Poland for treatment of erysipeloid infection in man because serum from hyperimmune sheep causes less severe reactions than does horse serum.

A method of bacterial lysis without heat or chemicals was developed which eliminated the toxicity sometimes produced by lysis of bacteria by these methods. Lysis, by the use of pepsin, produces a highly antigenic nontoxic erysipelas vaccine. Additions of aluminum hydroxide may further enhance antigenicity. The use of this vaccine in France has been successful.

Reports from European investigators,[52] states that, because of difficulties in treating an artificial infection in pigs by inoculation with *Erysipelothrix rhusiopathiae*, there is a lack of data on the degree and duration of immunity conferred by vaccines. The skin scarification technic of inducing infection gave satisfactory results for some investigators while for others it had little value.

Aitken[54] published an editorial on the most important phases of work completed to date. He considered the percutaneous test one of the most basic advances made in the swine control program for many years. With this we agree. Further work needs to be done on other factors, such as the use of antibiotic feeds, diet, environment, heredity, and the influence of commercial fertilizers on the farms.

The writer has observed many herds of swine that were bothered with lameness, stiffness, arched backs and joint involvement that were running on pastures or were consuming

The most susceptible age of pigs to swine erysipelas is from three to 12 months, although it is not infrequent in older animals. Infection tends to recur in succeeding crops of pigs, either through contact with chronically infected animals that appear in good health or through exposure to contaminated lots, houses, or equipment.

grains that had grown on fields to which certain commercial fertilizers had been applied. In one instance, we observed a herd in which the above symptoms were noted after animals reached 60 to 70 lb. weight. This herd of hogs had been vaccinated for swine erysipelas three different times by three different veterinarians without any change in symptoms during the summer months. By the time the herd reached an average weight of 200 to 225 lb., many were so badly crippled the owner was unable to market them. Blood analysis of the swine indicated a calcium-phosphorus imbalance. This information is cited because sometimes we might re-evaluate our thinking regarding a crippling condition in swine.

Cooper *et al.*[55] reported that their experiments indicated that erysipelas adsorbate vaccine appeared to confer satisfactory immunity in vaccinated swine. This work was done in the laboratory using the skin scarification technic as a measurement of resistance or susceptibility.

Shuman[54] attempted to evaluate the value of an adsorbate bacterin. He concluded that, although the experimental results do not appear effective on a percentage basis, it was apparent that some degree of protection was induced. He states that, "again, as was experienced in baby and weanling pigs vaccinated with culture and serum, there was a variation in the results of scarification on an individual basis to the four exposure strains. Therefore, to be consistent in our method of evaluation, we continued on the basis that, if a pig gave a skin reaction of sufficient intensity to only one exposure strain, it was considered susceptible, even if the other two or three exposure strains produced complete or incomplete immune skin reactions." The writer feels that this was a careful observation because of the very nature of the disease as it appears under farm conditions. There may be several strains of organism on the same farm.

Callaway *et al.*,[57] published an article on the results of their work with an adsorbed swine erysipelas bacterin made according to the German workers. No information is given as to the method of preparation. According to the authors, a local swelling at the site of injection had been reported. Local reactions in older swine persisted for several months. They recommended vigorous shaking of the vial before use and during vaccination to avoid postvaccinal swelling. This was important because most of the antigenic component is found in the contained alum. Revaccination at six months of age is recommended for breeding stock.

Fortner[58] showed that different families of swine, when exposed to erysipelas under identical conditions, reacted quite differently — some developing a mild form of the disease; others a fatal form. Subsequent generations reacted identically, indicating that resistance was inherited.

During the last few years, there have been several different types of erysipelas vaccine produced by commercial laboratories. They are of great importance to the swine producer and the veterinarian. Advancements have been made because some of the vaccines have been made from highly antigenic cultures but the vaccine is not capable of setting up new foci of infection on the farms on which it is used.

In addition to the adsorbate aluminum hydroxide killed vaccines,[59] there is another vaccine called a lysate[60] which consists of bacterial cells that have been rendered permeable or are ruptured. Saponin is used in the vaccine in order to produce a mild local irritation which delays absorption and thus acts as an adjuvant.

Another vaccine (EVA)[61] has been introduced recently to the veterinary profession. It is a desiccated, live culture, avirulent, erysipelas vaccine. The producers claim that it may be used with safety and does not cause vaccination reactions, either localized or systemic. Immunity is produced within about 15 days and lasts for at least 180 days.

At this writing, there is a possibility that the newer vaccines may, at least in part, replace the use of live culture and serum in our future immunization program.

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Poulardization Of New Hampshire Pullets†

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CONSIDERABLE interest in fattening poultry by the use of estrogens, antibiotics, vitamins, and gonadectomy, together with proper feeding, care, management, and disease control, has increased tremendously in recent years. Aside from economic considerations, the intensive production of more eggs and flesh by the proper application of more recently acquired scientific knowledge is one of the surest means of meeting the increasing demands for these food items.

Poulardization, the desexing of the female bird and the counterpart of an analogous operation of the male bird, may be utilized to advantage by inducing culled female chickens to put on more flesh, just as caponization does on cockerels. If poulardization can improve the quality and growth of culled female chicken, then it means added profit to the poultry raiser.

A search for local scientific literature on the subject of poulardization of chickens failed to show any previous work done along this line in the Philippines.

Materials and Methods

Thirty New Hampshire pullets of various ages ranging from two to four months of age were employed.

The surgical and laboratory equipment consisted of: A small table 30.5 x 24 x 16 in., caponizing spreader, scalpels, forceps, probe, caponizing scoop, pair of scissors, drapes, cotton, 10 cc. syringe, hypodermic needles, compound microscope, slides and cover glasses, Toledo balance, a porcelain tray, two aluminum kettles (16.5 in. deep and 9.5 in. in diameter), electric stove, and a watch.

The drugs and vaccines used were: 70% ethyl alcohol, sodium sulfamethazine 12.5% solution, phenothiazine powder, 5% dextrose-saline solution, avian pest, fowl cholera, and fowl pox vaccines.

The birds were kept in an outdoor, galvanized iron shed provided with a wire enclosure 192 x 168 x 60 in. In addition, a vacant room was used for the cages of the birds. A wire cage 88 x 54 x 34 in., three bamboo cages, each measuring 60 x 12 x 12 in. and divided into four equal compartments, were also used in the experiments.

Preoperative Care and Management

Five New Hampshire female chickens of various ages ranging from two months to one year of age were used for practicing on poulardization until a fair degree of proficiency was acquired.

Upon the arrival of the chickens, they were tagged for identification and were confined in a wire cage inside a vacant room with wide windows through which sufficient air and sunlight could pass. The chickens were given abundant supply of feeds and fresh water and observed for any sign of disease. Feces were examined microscopically for parasite eggs occasionally.

Four days after arrival of the chickens they were immunized against avian pest and fowl pox, and one week later against fowl cholera. For another two weeks they were observed further for signs of diseases. The chickens were given abundant feeds in long, self-feeder troughs and plenty of fresh water in water vessels and drinking troughs; sanitary measures always were observed. Chopped green grass also was given. To prevent coccidiosis, 12.5% sodium sulfamethazine solution in drinking water and phenothiazine powder for roundworms mixed with the feeds were given regularly.

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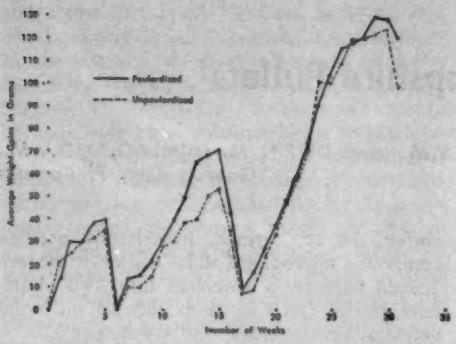

Fig. 1. Average weekly weight gain per bird of five two-month-old poulardized and five two-month-old unpoulardized New Hampshire chickens.

Operative Technic

Prior to the operation, the experimental birds were fasted for 24 hours. All of the birds were weighed and their individual weight recorded just before the operation.

On a small table a bird was placed on its right side. Weighted cords were securely attached; one at the base of the wing, another at the leg. These cords were attached in such a way as to stretch the bird with the least amount of discomfort and without impairing blood circulation.

The left ovary is situated in the dorsal part of the abdominal cavity, slightly on the left of the median line and attached to the dorsal wall. It lies approximately opposite the last three ribs. Anteriorly, it is in contact with the membranous diaphragm, and dorsally with the anterior one-third of the left kidney. Ventrally, it is in contact with the spleen and proventriculus, and medially with the posterior vena cava. Posteriorly, it is related with the cecae about one-half inch from where they empty at the junction of the ileum and colon. The left oviduct extends backward against the dorsal part of the left body wall and is related to the vertebral column, ilium, and ischium. It is attached to the dorsal body wall by a fold of peritoneum and opens into the cloaca lateral to the opening of the left ureter. The right ovary and the right oviduct are absent (Sisson and Grossman[1]).

The site of operation was between the last two ribs. With the bird properly restrained, the feathers on the operative site were plucked, and the skin was disinfected with 70% ethyl alcohol. A clean drape (fig. 4) with a slit corresponding to the size of the incision then was wrapped around the bird. The skin was then incised at the area of operation, thereby exposing the thigh muscles. The last two ribs were exposed next by pushing the thigh muscles back with the end of the scoop inserted under them up to the last rib. The last rib was used as an anchor of the inserted end. With the last two ribs exposed, an incision three-fourths to one inch long was made through the intercostal muscles. White[3] recommends the incision close to the anterior border of the last rib to avoid cutting the intercostal artery. Care was observed not to incise too deeply or too near the vertebral column to avoid cutting the lung and the kidneys. A spreader was then inserted in the incision and the blunt end of the scoop was removed. The glistening peritoneum was punctured with a pointed hook to expose the abdominal viscera and the left ovary.

The left ovary was covered by a delicate membrane which was torn off with an artery forceps. The overy was then removed completely from each bird with a scoop and weighed. A small portion of the oviduct also was cut with a pair of scissors. Slight hemorrhage from the ovarian stump was controlled by placing pledgets of absorbent cotton which were removed later. Sulfanilamide powder was then dusted on the stump of the removed ovary

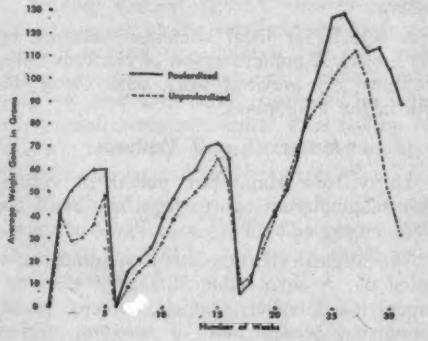

Fig. 2. Average weekly weight gain per bird of five three-month-old poulardized and five three-month-old unpoulardized New Hamshire chickens.

and the lips of the wound. Finally, the spreader and drape were removed. The thigh muscles slipped back to their proper place covering the incision and acting as a natural bandage. The right side of each bird also was opened to make sure of the absence of the right ovary as reported by Sisson and Grossman[1]. Five per cent dextrose-saline solution was given intramuscularly to some of the operated birds to compensate for the hemorrhage during the operation. Fifteen to 20 cc. were given to the 2-, 3- and 4-month-old poulardized birds.

Postoperative Care and Management

The poulardized pullets were confined in three bamboo cages. During the first two days after the operation, the poulardized birds were fed with small amounts of wet growing mash consisting of four parts rice bran, two parts copra meal, two parts ground corn, two parts fish meal, 1% salt and 2% oyster shell and plenty of fresh water. This ration was changed gradually to a dry form of this mash and increased until the birds were getting the same amounts as the unpoulardized pullets at the end of the first week.

On the fifth week, the growing mash was changed to a fattening ration consisting of two parts rice bran, six parts ground corn, two parts copra meal, 1% salt and 2% oyster shell. On the ninth week, the fattening ration was then changed to laying mash consisting of four parts rice bran, three parts copra meal, two parts ground corn, one part fish meal, 1% salt, 2% oyster shell, which was then given until the end of the experiment. These feeds were provided *ad libitum* together with plenty of fresh water. Chopped green grass, grit, and table refuse also were given until the thirty-first week.

The birds were divided into two separate groups, the experimental and the control groups, and placed inside the wire enclosure of the outdoor shed. Poultry wire completely separated the two groups. Each group, experimental and control, was further subdivided into 2-month-old, 3-month-old, and 4-month-old groups with five pullets in each subgroup.

The experimental birds were poulardized, according to the technic described. The time consumed by the operation, weight of the removed ovary, duration of healing, and post-operative complication for each bird were recorded. The operated birds were kept in separate cages to prevent the birds from fighting. After the wounds were healed completely (seven to nine days) the birds were transferred to the common enclosure in the outdoor shed. The behavior of the poulardized and unpoulardized birds were likewise studied, and the individual birds were weighed weekly.

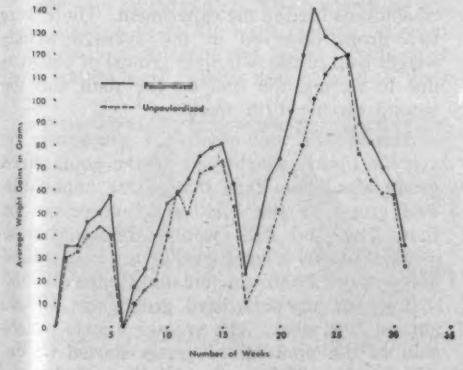

Fig. 3. Average weekly weight gain per bird of five four-month-old poulardized and five four-month-old unpoulardized New Hampshire chickens.

Fig. 4. Properly restrained and draped two-month-old New Hampshire pullet with a caponizing spreader in place. The equipment and instruments used in the operation are also shown.

To determine the quality of the poulard flesh, a cooking experiment was conducted 31 weeks after the experiment. For this observation three poulards and three unpoulardized hens, each taken from the different age groups of the two main groups, were dressed and cooked, using the same amount of ingredients and method. Two aluminum kettles and an electric stove were used and the cooking time also was recorded.

Discussion

Proper age to poulardize. Although the recovery from the operation was fastest in the two-month-old poulardized group than in either of the other two poulardized groups, the highest total average gain in grams over their respective controls were shown by the three- and four-month-old poulardized groups as shown in figures 1, 2, and 3. From this angle of the studies and the results thus far obtained, it seems desirable to poulardize the pullets at three and four months of age.

Duration of operation. The time that elapsed from the incision of the skin up to the removal of the spreader in the two-month-old pullets ranged from 20 to 25 minutes with an average of 22 minutes. In the three-month-old pullets the duration of operation ranged from 25 to 30 minutes with an average of 28 minutes and in the four-month-old, 30 to 35 minutes with an average of 31 minutes (table 1). The

operation is delicate and tedious as the ovary, which is broadly attached on the left dorsal wall of the abdominal cavity, could not be ablated as a whole and the ensuing hemorrhage obscures the location of the ovary. With more practice, however, the duration of operation could be shortened.

Average weight of the removed ovary. The weights of the removed ovaries are recorded in table 1. In the two-month-old pullets, the average weight of the removed ovary was 0.22 gm.; 0.24 gm. in the three-month-old pullets, and 0.36 gm. in the four-month-old pullets, suggesting that the ovary weight increases with the age of the bird.

Duration of healing. It may be seen in table 1 that the duration of healing varies within narrow limits in the different groups of experimental birds under the same postoperative care and feeding. In the 2-month-old pullets, the average duration of healing was seven days; in the 3-month-old pullets 7.4 days, and in the 4-month-old pullets 7.6 days.

Complication. The postoperative complication that developed in all operated birds was wind puffs (table 1). This was observed to develop as early as one day after the operation.

TABLE 1. Showing Duration of Operation, Weight of Removed Ovary, Duration of Healing, and Postoperative Complication in Five Two-month-old, Five Three-month-old, and Five Four-month-old New Hampshire Pullets.

Bird No.	Duration of Operation (In Minutes)	Weight of Removed Ovary (In Gm.)	Duration of Healing (In Days)	Postoperative Complication
Two-month-old Pullets				
1	20	0.25	7.0	Wind puffs
2	25	0.20	7.0	do
3	20	0.20	7.0	do
4	20	0.20	7.0	do
5	25	0.25	7.0	do
Avg.	22	0.22	7.0	
Three-month-old Pullets				
11	30	0.25	7.0	Wind puffs
12	30	0.25	8.0	do
13	30	0.20	7.0	do
14	25	0.25	8.0	do
15	25	0.25	7.0	do
Avg.	28	0.24	7.4	
Four-month-old Pullets				
21	30	0.30	7.0	Wind puffs
22	35	0.50	7.0	do
23	30	0.40	7.0	do
24	30	0.30	9.0	do
25	30	0.30	8.0	do
Avg.	31	0.36	7.6	

Fig. 5. Showing a two-month-old poulard and an unpoulardized New Hampshire hen 31 weeks after the experiment.

Fig. 6. Showing a three-month-old poulard and an unpoulardized New Hampshire hen 31 weeks after the experiment.

Payne[9] states that "they are caused by the air which escapes from the body cavity through the opening between the ribs and becomes trapped between the skin and body proper. The air pressure under the skin continues to develop until the bird is uncomfortable, awkward in getting about, and has little or no appetite." This condition was remedied by an elliptical incision through the skin.

Gain in weight. Figures 1, 2, and 3 show graphically the average weekly gain in weight of the poulardized and unpoulardized groups of chickens used in the experiment. There were two drops observed in the average weekly weight gain of the two main groups of chickens due to storms; the first on the sixth and the second on the 17th week.

Among the two-month-old chickens, the average weekly weight gain of the poulardized group was higher than that of the unpoulardized group by the 31st week except on the first, 24th and 27th weeks. The maximum average weekly weight gain of the poulardized group was 129.40 gm. on the 29th week and that of the unpoulardized group was 124.40 gm. on 30th week. The average weekly weight gain of the poulardized group started to decline on the 30th week and that of the unpoulardized group on the 31st week. The total average weight gain of the poulardized

over that of the unpoulardized group was 165.40 gm. by the 31st week.

The average weekly weight gain of the poulardized group among the three-month-old chickens was higher than that of the unpoulardized group by the 31st week except on the 17th, 18th, 21st and 22nd weeks. The maximum average weekly weight gain of the poulardized group was 130 gm. on the 26th week and that of the unpoulardized group was 114 gm. on the 27th week. The average weekly weight gain of the poulardized group started to decline on the 27th week and the unpoulardized group on the 28th week. The total average weight gain of the poulardized group was 416 gm. over that of the unpoulardized group by the 31st week.

Among the four-month-old chickens, the average weekly weight gain of the poulardized group was higher than that of the unpoulardized group from the first to the 31st week except on the 11th week. The maximum average gain in weight of the poulardized group was 140 gm. on the 23rd week, whereas that of the unpoulardized group was 120 gm. on the 26th week. The average weekly weight gain of the poulardized group started to decline on the 24th week and that of the unpoulardized group on the 27th week. The total average weight gain of the poulardized over that of the unpoulardized group by the 31st week was 405.80 gm.

Comparing the three groups of birds used with regard to age group, the three-month-old group showed the highest average gain of 416 gm., followed by the four-month-old chickens with an average of 405.80 gm. and the last in the series being the two-month-old birds with an average of 165.40 gm. over their respective control.

Behavior of the pullets. The poulardized pullets' abilities to cackle were entirely removed. They became sluggish and docile. Their comb and wattles were smaller and paler than those

Fig. 7. Showing a four-month-old poulard and an unpoulardized New Hampshire hen 31 weeks after the experiment.

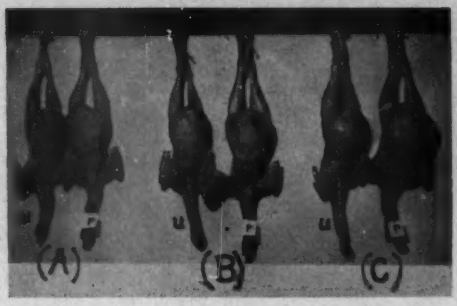

Fig. 8. Showing the dressed New Hampshire chickens thirty-one weeks after the experiment: (A) u—a two-month-old unpoulardized hen and p—a two-month-old poulard. (B) u—a three-month-old unpoulardized hen and p—a three-month-old poulard, (C) u—a four-month-old unpoulardized hen and p—a four-month-old poulard.

of the unpoulardized birds. The ability to lay eggs were entirely lost in the poulardized birds. Not one of the poulards laid eggs, in contrast to all of the control birds. The bodies of the poulardized pullets were larger than those of the unpoulardized birds. The poulardized birds had longer tail feathers (figs. 5, 6, and 7).

Quality of the flesh. It was noted during the dressing and cooking experiments that the poulards had more subcutaneous, visceral and abdominal fat than the unpoulardized birds. The dressed poulards had larger and more rounded bodies than the dressed, unpoulardized birds as shown in figure 8. The dissolved fat from the poulards at the surface of the broth was thicker than that from the unpoulardized birds. The average cooking time of the poulardized birds was 74.5 minutes while that of the unpoulardized birds was 88.5 minutes. The flesh of the poulardized birds was more tender and soft than that of the control birds.

Summary

The result of the studies on poulardization of New Hampshire pullets is summarized:

1. The appropriate site of incision is between the sixth and seventh ribs.

2. The right ovary and oviduct were absent in all the birds poulardized.

3. The duration of operation, average weight of the removed ovary, and duration of healing increase with the age of the birds.

4. The best age to poulardize pullets is at three and four months of age. Comparing the three groups of birds used, with regard to age group on the total average weight gain over the

(Continued on page 698)

Prevention Of Relapses In Milk Fever

J. R. HARRIS,* D.V.M. and T. B. CLARKSON,** D.V.M.,
Bristol, Tennessee

THE incidence of relapses following the treatment of milk fever with calcium has shown a marked increase with the development of high producing dairy cows, reaching as high as 50% in some high producing herds[1]. For this reason, great efforts have been made to find a reliable and convenient treatment that would eliminate or reduce the number of these treatment failures. The purpose of this report is to present a practical and pharmacologically sound approach for the prevention of relapses in uncomplicated cases of milk fever.

The definite association of hypocalcemia with the clinical symptoms of milk fever was first described independently by Little and Wright[2] and by Dryerre and Greig[3] as early as 1925. Their initial work served as a basis for using parenteral calcium solutions in the treatment of milk fever and represented a major advance in veterinary therapeutics. Since that time, there have been only minor variations in the standard therapy of milk fever. Some of these variations include the use of vitamin D, cortisone, and adrenocorticotropic hormone (ACTH). Recent work by Hibbs, *et al.*[4] has shown that the feeding of 30,000,000 units of vitamin D daily for a minimum of three days and up to seven days prepartum and one day postpartum was successful in preventing milk fever in ten cases by producing an elevated serum calcium and phosphorus level. Due to the expense and inconvenience of this high dosage level, it is doubtful if this therapy will have widespread use. Adrenal cortical hormones in general seem to be contraindicated in hypocalcemic conditions because they produce a drop in serum calcium[5,6].

The actual cause of milk fever remains unknown; however, the most basically sound theory is still considered to be that proposed by Dryerre and Greig,[3] who attributed the hypocalcemia to a temporary exhaustion of the parathyroid glands. The basis for their theory is the close similarity between the serum calcium level and symptoms of milk fever and those of hypoparathyroidism in animals and man. They felt that since proper calcium and phosphorus metabolism is dependent upon the normal functioning parathyroid glands, exhaustion of these glands might well occur at the time of parturition when the cow's calcium metabolism is relied upon for the secretion of colostrum and the ensuing lactation period.

With the pharmacological rule that all therapy should be directed as nearly as possible towards the specific cause, we began our search for agents having a specific role in parathyroid activity. The parathyroid hormone was considered and discarded due to its tremendous expense and the fact that its hypocalemic effect is gone in approximately 24 hours[7]. Dihydrotachysterol (parterol)® was finally chosen since it seemed to have all of the advantages we were seeking. Its ability to elevate serum calcium is equal to that of the parathyroid hormone,[7] it is relatively inexpensive, and its action lasts for at least 72 hours[8].

Pharmacology

Dihydrotachysterol, a crystalline derivative of ergosterol, is produced by ultraviolet irradiation. It has a specific elevating effect on serum calcium mobilizing calcium stored in the bones and increasing the absorption of calcium from the intestinal tract. McChesney[9] has found that dihydrotachysterol is more active biologically than vitamin D by the oral or parenteral route. Another striking difference between this drug and vitamin D is that dihydrotachysterol is believed to be able to substitute for the parathyroid hormone[10]. It has the same general physiological effects as the parathyroid hormone, except that it has a much longer duration of action, and tolerance is not built up for dihydrotachysterol as it is for the parathyroid hormone.

The effect of dihydrotachysterol on the serum calcium of normal, lactating cows was studied. Five cows were picked at random from a dairy herd and a control sample of blood was taken from each cow, which showed

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an average serum calcium level of 9.61 mg. per 100 cc. All were injected intramuscularly with 10 mg. of dihydrotachysterol in oil. Blood samples were taken at 12, 24, 36, and 60 hours. There was a gradual increase of serum calcium beginning in 12 hours and at 60 hours the level was 10.96 mg. per 100 cc. as opposed to an increase from 6.6 mg. to 8.9 mg. per 100 cc. in 24 hours when a 10 mg. dose of parterol® was injected alone in a hypocalcemic cow. This case showed a complete remission of hypocalcemic symptoms in 24 hours; however, no alleviation of symptoms was noted until after 12 hours, pointing to the desirability of using intravenous calcium to overcome the immediate symptoms, and parterol to maintain the hypercalcemia for a prolonged period. This further substantiates our claim of better action with dihydrotachysterol when the animal is undergoing parathyroid stress. Dihydrotachysterol has a wide margin of safety. We have given cows as much as 50 mg. intramuscularly at one injection without any visible ill effects.

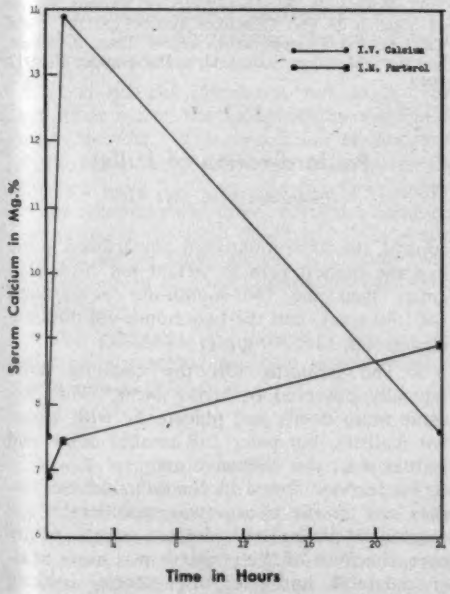

Figure 1. To illustrate the importance of the duration of action of the two drugs, a hypocalcemic cow was injected intramuscularly with 10 mg. of parterol alone and the serum calcium compared with typical values published by Craige[10] for the response of a cow to intravenous calcium. It is clearly evident that the hypercalcemic action of parterol is developed sufficiently to meet the physiological requirements for serum calcium before the intravenously administered calcium salt is dissipated completely.

The mode of action of dihydrotachysterol in preventing milk fever relapses is by virtue of its pharmacological property of producing prolonged hypercalcemia[12]. The onset of its hypercalcemic effect is too slow to obliterate the necessity of intravenous calcium at the time of treatment. We have found that the most gratifying clinical results were obtained by injecting 10 mg. intramuscularly at the time of intravenous calcium administration. The greatest majority of relapses following intravenous calcium therapy alone occur approximately 20-24 hours after treatment. This probably can be accounted for on the basis of Craige's[10] work on the physiological reactions of the cow to intravenous calcium injections. He found that 500 cc. of a calcium solution equal to 15% calcium gluconate given intravenously was capable of increasing the serum calcium content from its normal value of 9-11 mg.%[11] to almost double in 30 minutes. Yet, the difference between the blood calcium level before the intravenous injection and 24 hours afterwards was only 0.08 mg.%. From this work, it is apparent that practically all of the administered calcium salt is excreted within 24 hours.

We are of the opinion that cows that relapse after calcium therapy alone have simply not had time for their exhausted parathyroid glands to return to a functional state. The hypercalcemic effect of dihydrotachysterol becomes well developed before the shock of the rapid excretion of the intravenous calcium affects the animal. It remains effective for 72 hours, thus allowing time for the cow to overcome the parathyroid exhaustion. This basis for relapse prevention with parterol can be illustrated by figure 1.

Clinical Evaluation

An extensive program of clinical evaluation was carried out to substantiate the basis of this treatment. A total of 328 cases of uncomplicated milk fever have been treated with calcium gluconate intravenously and 10 mg. of parterol intramuscularly with only seven relapses.

A breakdown of the clinical evaluation program is shown in table 1.

Summary

The various causes of milk fever have been discussed and a basis given for the most accepted theory. The pharmacological properties of parterol (dihydrotachysterol) were presented and their association with the prevention of relapses in uncomplicated cases of milk

TABLE 1. A Breakdown of the Clinical Evaluation Program

Investigator	No. Cases	Amt. of Parterol given at time of calcium injection mg.	Estimated previous % of relapses	% of relapse with Parterol
A. B. Christian, D.V.M. Biltmore Farms Asheville, N. C.	100	10	30	0
R. E. Carroll, D.V.M. Roger Jessup Farms Glendale, California	80	10	25	0
J. A. Jordon, D.V.M.	15	10	20	0
J. A. Chambless, D.V.M. Lexington, N. C.				
J. D. Morton, D.V.M. School of Veterinary Med. University of Georgia Athens, Ga.	16	10	20	0
S. J. Shirley, D.V.M. Commerce, Ga.	42	10	20	2
Roy Smith, D.V.M. Lebanon, Virginia	15	10	20	0
L. B. Young, D.V.M.	60	10	25	5
W. T. Kennedy, D.V.M. Johnson City, Tenn.				

fever discussed. An explanation for relapses in milk fever treatment has been presented, and the mechanism by which parterol prevents these relapses has been discussed. A total of 328 cases of milk fever in dairy cows have been treated with intravenous calcium and intramuscular parterol with only seven incidences of relapse, a 0.0213% relapse rate as opposed to previous average relapse rate of 22.8%.

Acknowledgments

The authors wish to express their appreciation to the practicing veterinarians who helped to evaluate this compound in clinical cases of milk fever.

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Poulardization of Pullets

(Continued from page 695)

control, the three-month-old poulardized group had the highest gain in weight per bird (416 gm.), then the four-month-old poulardized (405.80 gm.), and the two-month-old poulardized group, (165.40 gm.).

5. The poulards lost the cackling habit typically observed in laying birds. They became more docile and phlegmatic with longer tail feathers, but paler and smaller comb and wattles than the control birds.
6. Fat deposit found in the subcutaneous tissues and in the viscera was considerably increased in poulardized, dressed pullets. Moreover, the flesh of the poulards was more tender, palatable, and juicy after shorter cooking than that of the control birds.

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EDITORIAL COMMENTS

Effectiveness of Poliomyelitis Vaccine

The quotation following is selected portions of a speech by Dr. Leonard A. Scheele, Surgeon General of the Public Health Service, prepared for presentation at the Economic Club of Detroit on October 3, 1955. The complete statement was released for publication at that time and carried an encouraging message to parents of susceptible children, and others.

"The number of reported cases of poliomyelitis, paralytic and non-paralytic, among the 7,000,000 children in the United States vaccinated this year is now running 25 to 50% below the incidence expected without vaccination in the same age groups. These are preliminary results but appear to indicate the trend.

"In epidemic areas, particularly in New England and Wisconsin, the infrequency of paralytic cases among vaccinated children is notable. Especially intensive studies are being conducted in these states.

"It is difficult, however, not to be very optimistic about the value of the vaccine as used this year. The reports are all the more encouraging because the vast majority of these children have had only one injection, instead of the recommended three received by children vaccinated in the 1954 field trial. It is reasonable to expect even greater protection when the full course of immunization has been completed.

"The prospects are indeed bright for the effective control of paralytic poliomyelitis in the nation in 1956".

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Blood samples collected from cattle from all sections of Ohio between March and August 1954 were examined for leptospiral antibodies by the agglutination-lysis test. Of 10,000 samples examined, 388 (3.88%) were demonstrated positive in a dilution of 1:100 or greater.

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Experiments by Lambert in Dublin (*The Summary*, May 1955) suggests the beneficial response in a high percentage of cardiac cases in dogs and initial improvement that is usually sustained for considerable periods when vitamin E is provided continuously at high levels.

Feed Additive for Ketosis Prevention

The excellent results obtained in the control of ketosis by feeding a complex mixture of sodium and calcium salts of lignosulfonic and wood sugar acids (Maracarb®-Marathan Corporation, Rothschild, Wisconsin) suggest again that the probable cause of this stress disease in high-producing dairy cows may be more intimately associated with a deficiency in complex carbohydrates than in the mechanisms of metabolism of simple carbohydrates or of proteins. Considering that carbohydrate digestion in the ruminant can take place in the entire gut as is true in simple stomached animals, perhaps too much emphasis has been placed upon the role of rumen organisms in this disease and not enough on the mechanisms of digestion of sugars in other parts of the gut. Also perhaps more effort is needed to determine what complex sugars are required to sustain cows during the stress of high milk production. —*Roy E. Nichols, D.V.M.*

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Poultry House Air Conditioning Tests May Aid Heat Wave Areas

Air-conditioning for poultry houses, now employed experimentally at the University of Delaware, may find immediate application in the expanding broiler industry of the Southeast and West.

Reports from San Diego county, California, indicate the late summer heat wave cost poultrymen 25% of their crop.

At Delaware, broilers are being raised in quarters where the temperature can be regulated at any level between 60 and 90 F. Humidity control is possible between 40 and 100%.

The purpose of the Delaware experiment, according to E. F. Waller, chairman of the Poultry Industry Department, is to arrive at ideal atmospheric conditions for broilers. However, the technics used to control temperatures are expected to be of immediate, practical interest in all regions where the intense heat spells of 1955 are likely to recur.

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Growers have not yet succeeded in producing market hogs at lower cost by weaning pigs at three weeks of age.

California Passed Garbage-Cooking Regulations

The California Department of Agriculture has adopted a new regulation pursuant to a law enacted by the 1955 legislature relating to control of diseases of garbage-fed swine. The regulation entitled, Swine Diseases from Garbage, adds article 7 to the California Administrative Code. The law and regulation become effective January 1, 1956.

This act requires that all garbage fed to hogs be heat treated. It also provides for the licensing of all premises on which garbage is fed swine and requires that the operators of all such places follow sanitary practices in accordance with the rules and regulations issued by the Department.

The regulation describes the application form and the method of applying for a license to feed garbage to hogs. It also provides that the State Department of Agriculture shall inspect and approve the premises and facilities used in garbage cooking and feeding before a license can be issued.

The regulation specifies the type of construction of buildings and equipment of new and existing hog ranches and the sanitary requirements necessary to prevent continuation and spread of vesicular exanthema, a serious virus disease of hogs.

The licensing and other requirements of the law and regulation are in addition to those which also may be required by city or county ordinances.

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Contaminated Athletic Fields

The inquiry of a physician regarding tetanus immunization for football players appears under Queries and Minor Notes, *Jour. Am. Med. Assn.*, Oct. 22, 1955. It was noted that the playing field also was used to parade and occasionally to pasture or stable various classes of livestock. In answer, it was emphasized that the practice of using any area where livestock is pastured or paraded for an athletic field, such as is used for football, is unwise. Soil contamination with tetanus and other clostridial spores is highly probable and potentially dangerous. Players using such field should be required to have a series of injections to assure high antibody titer.

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Ornithosis in turkeys may be confused with chronic respiratory disease.

A Dozen Roses

Because supply houses of professional veterinary products have been too modest to say so themselves, and because from my point of view I have seen and know what they have done and are doing for the veterinary profession, I feel they are deserving of the following bouquet:

1. They supply veterinarians with the best materials with which to practice.

2. Their cost of advertising of products pays a large share of the financial burden of our magazines and many other activities we could ill afford to be without.

3. They carry much weight in educating the public as to the value of veterinary service.

4. Their ethical handling of products helps stem the tide of nostrums.

5. They employ veterinarians wherever possible.

6. They play an important part in educating veterinarians in ways above and ahead of formal school training.

7. They are constantly developing new equipment, instruments, drugs, and biologics of improved value to the man in the field.

8. They are everlastingly trying to improve old products.

9. They help the profession keep up to date on interesting and useful news.

10. They have "watch dog" value in condemning bad and dangerous practices that they call to the profession's attention.

11. Their research program is ever functioning on behalf of our efforts.

12. Their help to new graduates getting started in the profession by giving proper advice and by extending credit is a worthy, appreciated activity.—*Edwin J. Frick, D.V.M.*

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North Dakota Bans Virulent Hog Cholera Virus

An act prohibiting the use of virulent hog cholera virus in North Dakota passed that state's legislature in session early this year and became effective July 1, 1955.

North Dakota is now the fifth state to restrict the sale of virulent hog cholera virus. Alabama, Georgia, Mississippi, and Tennessee enacted similar legislation earlier.

Leptospirosis in New Zealand

An epidemic of 262 cases of leptospirosis in dairy farm families, livestock handlers, and veterinarians is reported (*Jour. Am. Med. Assn.*, 159:143, 1955). The striking absence of infection in consumers of dairy products led to studies of the effect of milk on the Leptospira organism. The presence of a strong lytic agent was demonstrated in human, bovine, and caprine milk and human colostrum (Kirschner, *et al., Proc. Univ. of Otago Med. Sch.*, 33:4, 1955), thus accounting for the relative safety of dairy products as a source of leptospirosis. An earlier report by Kirschner indicated that in bovine milk, diluted 1:20 or more with neutral water (rain or tap water), Leptospira survive for at least 60 days.

Infection in these cases was attributed to either contamination of drinking water and/or direct contact.

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Frozen Bull Semen Achieves Commercial Status

The number of cows in the United States serviced by frozen bull semen now totals some 250,000 according to a review in *Capper's Farmer*, August 1955. Two artificial insemination associations, one in Oklahoma, and one in Canada are reported to have converted entirely to the use of frozen semen. Others are in various stages tending toward conversion.

At present conception rates, it may be possible for one bull to sire 35,000 calves a year with frozen semen since the new glycerine preservation technic eliminates previous losses. The matter also poses a ponderous problem of selection of sires. Better methods of determining superior sires must be developed or the danger of undesirable characteristics being strengthened might well negate advantages.

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Professor C. S. Plumb of Purdue University, perhaps taking the hint from the then popular European feeding practices, added a quantity of animal protein material to the corn ration being fed hogs at the University in 1901. Protein supplement used was tankage. Results were remarkable to say the least. The experiment induced such acceleration of growth that the pigs were ready for market in seven months or less — an unheard of feat in those times. This constituted a milestone in animal nutrition.

Bat Rabies Reported

The California Department of Public Health reports a case of rabies in a bat, the third found to be infected since early 1954. This flying mammal was caught by a man who saw it while pruning a tree in his backyard. He intended to catch it and give the bat to his son, but after being bitten, he decided to give it to a local science teacher. The bat was held overnight at the local high school and was found dead the following morning. Confirmation of the diagnosis of rabies was made by animal innoculation.

Additional information from California indicates that a large proportion of the total (291) cases of rabies in animals reported through October 4, were in skunks (104 cases).

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Although psittacosis is not a disease with a high frequency rate, morbidity and mortality statistics note that an increase of 233.1% in the number of cases occurred for 1954 as compared with those reported for 1953. Approximately 563 cases are reported for the current year, of which 200 are among employees of poultry processing plants. A large proportion of the remainder indicate that psittacine birds are the source of infection.

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Reports from some parts of the Corn Belt feeding area indicate losses suffered by cattle feeders due to rhinotracheitis have been considerable recently. Death losses are not great but morbidity, loss of weight and condition, has been serious. Cause of this newly described anomaly is unknown but its similarity to the mucosal disease complex and rinderpest has been pointed out. No treatment other than supportive has been recommended.

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Official estimates of average annual loss of milk due to ketosis is given at 116,712,900,000 lb., valued at $4,228,375,000. Annual losses due to cattle dying from the disease are placed at $5,000,000.

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Observations made by Fenton (*Poultry Tribune*, Aug. 1955, page 14) have convinced him that pullets reared in average New Jersey farmer poultry houses should have at least 3 sq. ft. floorspace per bird.

PRINCIPLES OF ANIMAL HEALTH

R. R. DYKSTRA, D.V.M.
Manhattan, Kansas

Gamma Ray Sterilization of Adult Male Flies for Screw-worm Control

The male screw-worm fly (*Cochliomyia americana*) can be sexually sterilized by exposure to gamma rays from radioactive cobalt, though still capable of the procreative act. The female screw-worm fly mates only once. In the comparatively small West Indian island of Curacao the screw-worm fly abounds the year around. An interesting concept is that if the island is highly saturated with sterilized males then the female eggs will be sterile, and thus the screw-worm fly and its larvae will be controlled. On the foregoing basis some 52,000 sterilized males were distributed by plane late in March, 1954, and subsequently 400 sterile males were released each week for each square mile of territory. The result up-to-date is that not a single screw-worm fly or eggs have been found since early November of the same year, nor has larvae infestation of livestock been reported by anyone. It is hinted that the same program, on a research basis, may next be tried during the winter months in sections of Florida and Texas where the fly lives during months of freezing temperatures in the northern states.

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Psittacosis in Man

In continuation, in a measure, of an article in this column about psittacosis, we now note a report in a medical journal regarding antibiotic treatment of this condition in man. In general, the following is indicated: Penicillin is relatively ineffective except when large doses of aqueous penicillin are used; administration of chlortetracycline, oxytetracycline, or tetracycline is followed by prompt improvement in a large percentage of patients.

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We have, at times, discussed the almost exact morphological identity of the human and swine Ascaris, though frequent attempts to infest man with the eggs of the swine parasite always have ended in failure. Now, however, Takata reports limited success in a venture of this nature though the *Ascaris sius* ova did not develop beyond the larval stage in man.

Foot-Rot in Sheep

In VETERINARY MEDICINE for September 1955, we commented on the handling of foot-rot in sheep. Recently the Veterinary Field Station of the University of Liverpool reported on the use of formalin in chronic severe cases of this common condition. It is assumed that formalin referred to is the same as that employed in this country — approximately 40% solution of formaldehyde in water. Foot-rot generally is looked upon as a sequel to unsanitary surroundings, and more specifically as an infection with *Actinomyces necrophorus*. The British project report, in severe cases, recommends trimming away all undermined horn without causing hemorrhage, since the presence of blood makes it impossible to determine the line of demarcation between the undermined horn and the healthy area. Each diseased foot is then immersed for from one to one and a half minutes in a 10% solution of formalin. (This would be about 4% formaldehyde gas). Healthy feet are treated for from 15 to 20 seconds. Animals are then placed in clean dry paddocks. This single treatment, when examined a week later, resulted in a 68% cure; the remainder had small pockets of infection so that horn needed additional paring, and more formalin (10%) applied for 30 to 60 seconds. At the third examination a few not completely relieved cases were again treated. End result, complete relief. Except in the most severe cases, the standard treatment in America, where flocks are large, is to compel afflicted animals to walk through a shallow bath of a 1% water solution of copper sulphate (blue vitriol).

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Safety of Methoxychlor as a Pasture Spray

According to newspaper reports the USDA at its research center in Beltsville, Md. has determined that methoxychlor insecticide, when sprayed on pasture and grassland, is not evident in the milk of dairy cattle. In one project dairy cows grazed on treated pastures for 40 to 80 days. Forage was determined to carry drug residues ranging from 16 to 100 parts of methoxychlor per million of roughage. No drug was detectable in the milk.

Some Applications Of Gastrointestinal Physiology To Small Animal Medicine†

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THIS discussion is limited to the possible clinical application of certain facts selected from the large amount of knowledge, concerning the physiology of digestion in the dog and cat. Particular emphasis is directed toward the explanation of various signs of disease and their rational correction.

In discussing digestion in the classroom, we attempt to describe and explain what happens in the oral cavity, esophagus, stomach, small intestine, colon, and rectum in that order. This includes the motor activity (or movements) of the various segments and the solubilization of the food, or the secretory activity of various glands which pour their juices into the lumen of the long, hollow digestive tube.

Hunger and Appetite

The desire to eat is accepted as a normal phenomenon and is regarded as a sign of health. Failure to eat normally, or anorexia, often is the only observation reported when an animal is presented to the veterinarian for diagnosis and treatment. The ability of the normal animal to maintain a relatively constant body weight is evidence of the existence of a sensitive mechanism for the adjustment of food intake to caloric expenditure. Healthy dogs have been starved for as long as 117 days with no permanent injury. However during this starvation period 50 to 60% of the body weight may be lost. A starvation period of such duration is neither physiological or habit forming.

The knowledge of hunger, while incomplete, is helpful in the understanding of disturbances of food intake. Hunger may be defined as all of those processes which lead to the ingestion of food. It includes at least three components: (1) Hunger sensations, (2) appetite, and (3) a kind of unnamed physiological state or hunger drive.

The hunger sensation is an inborn, instinctive and unconditioned disagreeable ache or pain in the epigastric region. The sensation is associated with strong peristalic contraction of the empty stomach. In this sense, the hunger pangs are said to be due to contractions of the empty stomach occurring in man and animals. Many clinical practices designed to increase or decrease food intake are really procedures devised to increase or decrease the hunger contractions of the stomach. One fundamental observation concerning hunger contractions is that they may be caused to abate by the entrance of any edible material into the stomach or intestine regardless of its caloric content. For this reason reducing diets are often formulated by the addition of a non-nutrient diluting substance. In rats, however, a gradual adjustment to dilution of the diet with cellulose may occur over a period of days.

Approximately 30 years ago, Carlson observed that a lowering of the blood sugar in

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dogs by the injection of insulin augmented the motor activity of the empty stomach of dogs. Early, it was believed that the hypoglycemia provoked hunger pangs and increased food intake entirely by increasing motor activity of the stomach via the hypothalmus and vagus nerves. At present the hunger producing effects of hypoglycemia are believed, at least in part, independent of gastric motility and of vagal continuity to the stomach. In one experiment, the daily injection of hypoglycemia doses of insulin into vagosympathetomized dogs increased the food intake to the same extent as in controls. Probably the only justified nondiabetic use of insulin is in certain cases of inadequate ingestion of food due to lack of appetite. We have successfully combatted selected cases of anorexia in our own clinic with this kind of therapy.

Appetite, while related to hunger, is a distinct and different entity. It is largely a mental state and is stimulated or inhibited by the smell, sight, or even thought of food. It is a pleasurable sensation referred to the mouth, is highly individual and may exist long after hunger is satisfied. It is not inborn but is an acquired or conditioned reflex involving learned food-taking patterns. Among animals, dogs and cats particularly display well developed conditioned reflexes with reference to food intake. In dogs amphetamine may cause the appetite to disappear and induce weight loss even though the gastrointestinal tract has been denervated. Thus, appetite appears to be largely a function of the higher divisions of the central nervous system. It is not without visceral manifestations, however, and a gastric element in its production has been advocated by many investigators.

The conventional concepts of hunger and appetite as just described are not sufficient to explain total patterns of food intake. Hunger sensations undoubtedly play a role in determining when food is eaten, but not how much, as they disappear after the entrance of a few mouthfuls of food into the stomach. Appetite for a particular kind of food often results in the ingestion of additional quantities when the stomach is already full. Hunger as a physiological state or hunger-drive leading to the ingestion of food in amounts adjusted to energy expenditure is less well defined and not understood. The level of the blood sugar might appear to be a determining factor, yet in diabetes mellitus, in which there is an unusually high blood sugar, a very markedly increased appetite exists. Also, to the writer's knowledge no one ever has demonstrated a correlation between spontaneous fluctuations in blood sugar and a desire for food in the normal animal.

Rather than the absolute level of the blood sugar, the utilization of glucose by tissue cells, as proposed by Mayer in the "glucostatic theory of hunger," seems more in accord with the facts. This theory maintains that there are gluco-receptors in the hypothalmus which are sensitive to arterial-venous glucose differences, or to some other signal of glucose utilization, which regulate caloric intake to caloric expenditure. Destruction of selected areas of the hypothalmus leads to hyperphagia and obesity in dogs. The hyperphagia and obesity in humans affected by tumors, infections, or other pathological processes of the hypothalmus is believed by some authors to be identical with that occuring experimentally in animals.

Selection of Food. Interesting is the ability of animals on a qualitatively deficient diet to select from a choice of foods the one which will correct the deficiency. The ability requires no learning and is closely associated with body needs. It has long been appreciated by animal husbandrymen that animals provided with a random of dietary constituents are better able to balance their diets than is the mill operator. Experimental biologists have observed that adrenalectomized, salt-depleted animals voluntarily select high salt diets, and that parathyroidectomized animals seek high calcium diets. The mechanism by which such selections occur are unknown but the observations support the idea that at least some of the perverted appetites reported in animals are the result of dietary deficiencies.

Why Dogs Eat Grass. Veterinarians are often asked why dogs eat grass. My opinion on this subject is that they usually do not eat it because of anything they are deficient in but because they have eaten something disagreeabl or for some other factor causing an uncomfortable feeling. The ingestion of grass is a trick to induce vomiting and afford relief similar to that obtained by the introduction of the fingers into the human throat. Often the clients will admit that the ingestion of grass is followed by vomiting.

Spontaneous hypoglycemia, while rather a rare clinical entity, also may provoke the ingestion of substances which are not considered constituents of a normal diet. I have only observed one case of spontaneous hypoglycemia in the dog, and in this instance a perverted appetite was not a part of the history.

Sometimes owners ask why puppies are continually chewing on nondietary articles. If it

be remembered that the empty stomach contracts vigorously and that these hunger contractions are associated with the hunger sensation an answer may be found. Chewing gum, tightening the belt, or eating non-nutrient substances will abolish hunger sensations and contractions temporarily in man. The puppy stomach probably empties in 1-3 hours depending on age, and indiscriminate chewing may start, but probably is not perpetuated, by too infrequent feeding.

Anorexia. The failure to ingest food in normal amounts, or anorexia, so commonly seen clinically, is far from being a simple sign. As may have been appreciated from what has been said concerning our knowledge of the factors governing normal food intake in healthy animals, it could be the result of diversified and multiple pathological processes. Roughly anorexia may be divided into central anorexia and reflex anorexia. Central anorexia would be that associated with infections, tumors or degenerative diseases involving the hypothalmus, cerebrum, or possibly other central nervous structures. Reflex anorexia is that depression of the central mechanism by nerve impulses or toxins arising out of, or from, pathological changes in the tissues of the gastrointestinal or other tissues of the body. Both are attended by loss of gastric and intestinal motility and tone. However, it is more likely to be a primary deficit in the reflex type of anorexia.

Reflex anorexia is common, occurs in acute and chronic infections in both man and animals. There is graphic evidence of complete depression of gastric motility in many of these conditions. Often even mild infections such as sinusitis, tonsillitis, mild upper respiratory infections, et cetera, are characterized by the absence of normal gastric motor responses. Diseases of the small and large intestine, the stomach, liver, urinary tract, and thoracic viscera all may depress food intake via viscero-visceral reflexes or the various, toxicities accompanying such conditions.

Experimentally thiamine deficiency results in anorexia and loss of normal B_1 tone in animals. The question of whether or not anorexia under such circumstances is desirable is open to question. There are some clinicians who say decisively that it is not and that it is a symptom to be treated along with other manifestations of disease. My own answer will depend upon my clinical impression as to basic pathology involved. In many cases nutritional support through proper parenteral feeding may be the best answer.

The Mouth

In the dog and cat, not a great deal of importance occurs in the mouth. The teeth are principally used for seizing and cutting food. There is not any grinding. These animals tend to swallow food in large pieces. This is normal and should be kept in mind when advising owners about diets of normal, healthy, adult animals. This trait is, in fact, valuable to the dog's digestion.. His diet is often largely protein. The only major chemical digestion in the stomach is that of protein. Food which is liquid or semi-liquid does not remain in the stomach nearly as long as does coarse, solid substances. Should the dog chew food over thoroughly or ingest only finely divided substances, only highly fluid material would reach the stomach and consequently there might be failure of desired gastric digestion. This supposition has been confirmed experimentally in both dogs and cats. Finely ground meat and chunk meat impregnated with barium was fed and the animals observed under the fluoroscope. The lumps were held in the stomach for a considerable period and slowly dissolved away. Ground meat passed quickly from the stomach into the intestine with only slight digestion by gastric juice.

The gases formed in the large intestine are largely the result of bacteria attacking undigested proteins. Some cases of undesirable flatulence in the dog can be corrected by recommending chunk meat and thus diminishing the possibility for undigested proteins reaching the colon.

An interesting point in connection with the mastication of food is that the dog can exert a pressure of 336 lb. per 10 sq. mm. of area (cross-section of stick in a lollipop) when chewing bones. It seems reason enough to muzzle a dog.

In connection with the prehension of foods, an interesting abnormality is that of the cleft palate in suckling animals. Sucking is accomplished by the creation of a negative pressure in the buccal cavity. The negative pressure is developed principally by tongue movements against a totally sealed oral cavity. In the presence of a cleft palate the seal is not perfect, there is an opening into the nasal cavity and the nasal regurgitation in a puppy always suggests cleft palate. This amounts to the same thing as trying to smoke a cigarette with a hole in the wrapper or drinking through a straw that has a hole in it. The mature dog does not prehend liquids by sucking but by ladling it with the tongue.

Salivation

The saliva of the dog and cat contains no known digestive enzymes. The most important function of saliva in these species appears to be that of moistening and lubricating the food mass to facilitate swallowing. The mucin content of the saliva is principally responsible for the lubrication. Other lesser important functions of saliva are its solvent action (important for taste), its cleansing action, its moistening and lubricating action on the structures of the oral cavity and pharynx, its excretory function (urea, rabies virus, Hg, Pb, KI) and its part in regulation of water intake since it largely controls the relative wetness or dryness of the mucous membrane of the mouth and pharynx which in turn are related to the sensation of thirst.

Normally there is no obvious secretion of saliva unless some stimulus is present. The normal stimuli are the presence of food in the mouth, the odor or sight of food, or some event which has invariably accompanied the reception of food in the past. This fact is important. It means that when salivation occurs under other circumstances something is abnormal and the reason should be sought. Abnormal or excessive salivation is referred to as ptyalosis or sialorrhea. It frequently accompanies difficult swallowing.

There are three major pairs of salivary glands; parotids, submaxillary and sublingual, plus the small buccal glands scattered over the oral mucous membrane. In all of these, two types of gland cells may be identified. Serous cells which produce a copious, watery secretion and mucous cells which produce a scanty, thick, mucus secretion. Corresponding to the two cell types are two kinds of secretory nerves. The parasympathetic nerves innervating the serous cells and the sympathetics, the mucous cells. Thus in the dog, when the parasympathetic nerves are stimulated or a parasympathomimetic drug (lentin, eserine, pilocarpine) is given, a thin, abundant, watery secretion results. When the sympathetics are stimulated or a sympathomimetic drug is administered a scanty, thick, mucus secretion results. This knowledge also in part explains the advantage of using a parasympathetic depressant drug like atropine, as preanesthetic medication for ether anesthesia. Such a drug lessens salivation and reduces opportunity for inhaling fluid into the lungs.

What I have just said about relationship of kind and quantity of saliva to nerve stimulation in the dog is not true in cats. In this species, sympathetic nerve stimulation will cause a profuse, thin, watery salivary secretion. In the normal animal body the sympathetic nervous system, together with the ardenal medulla is activated during periods of stress or emotion, like anger, anxiety, fear, pleasure. This probably explains the drooling that occurs in normal cats in the hospital when they are handled or petted.

The salivary glands are controlled by nerves. The particular nervous mechanism involved is the reflex arc. The essential components of any reflex arc are: Receptor, sensory nerve, reflex center in the central nervous system, efferent or motor nerves, and effector organ. If an appropriate stimulus is applied to the receptor organ of any reflex arc it generates impulses which are conducted over sensory nerves to the reflex center then discharges impulses over motor or secretory nerves to the effector organ where the response in the form of secretion or contraction occurs. There are many receptors which, when stimulated, cause the flow of saliva. The most important are those located in the mouth. The taste buds, touch, pain, and temperature receptors in the oral cavity all are capable of initiating salivary secretion.

Touch, pain, and distension are effective stimuli in many locations and explain the abnormal drooling of saliva in gingivitis, during scaling of tartar from teeth, teething in puppies, infected teeth, tumors, foreign bodies in mouth and esophagus, stomatitis, and chorea. In fact mechanical and chemical stimuli, painful or otherwise, in the mouth and esophagus may cause abnormal drooling. Also the reflex centers in the medulla may be directly stimulated in diseases of the central nervous system as in rabies, chorea, et cetera. Olfactory receptors (bitch in heat) and retinal receptors are also capable of stimulating the salivary glands.

Physiology of Deglutition

The next event is the transporting of the food mass to the stomach. This involves a discussion of the physiology of deglutition, or the forcing of food from the mouth through the pharynx into the esophagus and its transit to the stomach. This is a rather complex reflex act. I will attempt to bring out only a few things which may be of importance clinically. The act of swallowing for purposes of description is divided into three stages corresponding to the three anatomical regions: Mouth, pharynx, and esophagus.

The first stage of swallowing includes those events occuring in the oral cavity preliminary to the passage of the food mass through the pharynx and esophagus. This stage is voluntary. Two events are important in this stage. The first is the moistening of the material, if it is dry, and its lubrication with mucin. The swallowing of dry food is difficult or impossible. In fevers or any state of severe dehydration or following the use of drugs like atropine this factor may operate to produce dysphagia. In force feeding of animals it is well to insist upon well moistened food, or liquids.

The second important feature is tongue movements. The food is moved toward the back of the mouth by elevation of the anterior portion of the tongue which also prevents its escape from the buccal cavity. It is moved out of the oral cavity into the pharnyx by a sudden contraction and backward movement of the posterior half of the tongue. Any condition which serves to interfere with tongue movements, as glossitis, foreign bodies, points on teeth (in horses), rannulas, paralysis of hypoglossal, or trigeminal nerve, et cetera, may produce dysphagia in the first stage.

The second stage or passage through the pharnyx is involuntary, purely reflex in nature, rapid, and quite complex. The receptors for these reflex movements are located in the posterior pharyngeal wall and once stimulated swallowing movements must follow. They can not be voluntarily inhibited. This is the reason for placing pills, capsules, et cetera, far back in the mouth. From the pharnyx there are four possible exits. All of these except that into the esophagus must be closed if normal deglutition is to occur. The opening into the nasal cavity through the posterior nares is closed by elevation of the soft palate and approximation of the posterior pillars. When this does not occur as in paralysis of pharyngeal branches of the glossopharyngeal or vagus nerve, paralysis of the reflex centers in medulla, or pathological or anatomical deficiencies of the soft palate, attempts to swallow liquids are followed by their regurgitation into the nasal cavities. I have seen several such cases in the Ohio State Clinic. Entrance of food into the trachea is largely prevented by elevation of the larynx and reflex inhibition of respirations. When the laryngeal nerves are paralyzed, as in anesthesia, or semicomatose states, or the larynx is fixed by tumors, food may enter the trachea. These swallowing difficulties constitute dysphagia in the second stage.

In the third stage of swallowing, food is passed along the esophagus by peristalsis and through the cardiac sphincter into the stomach. In the dog the esophageal musculature is entirely skeletal. The peristalic passage of food is normally dependent upon vagal innervation.

Dysphagia in the third stage is usually associated with obstructions, diverticula, cardiospasm, or megaesophagus. Obstruction may involve foreign bodies, tumors, persistent brachial arch, et cetera. In the Ohio State University Clinic several cases of persistent brachial arch have been diagnosed and operated. Cases of cardiospasm or perhaps megaesophagus have also been encountered but neither medical nor surgical treatment has been entirely successful. These animals are usually young and have histories of persistent emesis of undigested material. They are always hungry, eat rapidly at first and then more slowly. In two such cases the cervical esophagus could be observed filling with food. Finally the animal stops eating, extends the head, makes repeated swallowing movements and then regurgitates the food through the mouth. *X*-rays after eating reveal a dilated thoracic esophagus beginning at the diaphragm.

Last week, a Cocker Spaniel was referred to the Clinic with a history of dysphagia and vomiting. A leptospirosis titer of 1:400 almost prevented the discovery of two constricted areas in the esophagus responsible for the symptoms described.

Motility of the Gastrointestinal Tract

The movements of the stomach and intestine appear to be governed by three factors: (1) The inherent, automatic rhymicity of the smooth muscles in their walls, *i.e.*, remove all nerve tissue and they are still active, (2) the enteric plexus or the nerve network entirely within the walls of the gut and intestine, and (3) the extrinsic nerves, parasympathetic and sympathetic, which are merely regulatory. That is, they only control the extent or degree of activity. They do not cause it.

Note that the parasympathetics are motor to all structures identified except the ileocecal and anal sphincters. They are the nerves of increased activity and defecation. Thus drugs which stimulate them will increase peristalsis of stomach and intestine. The sympathetic fibers are inhibitory, *i.e.*, decrease activity to all structures except the sphincters in whose instance they are excitatory. During emotional upsets when the sympathetics are active the stomach and intestines are quieted and food tends to be retained.

One more important fact. Distension within physiological limits is the most potent stimulus for increased movement of the stomach and intestine. When food is carried down the esophagus and enters the stomach it distends it, this distension increases its movement so that material is soon passed on to the intestine. The intestine is in turn distended and its movement is increased, and so it passes along the tube. If only highly digestible food is eaten most of it will be absorbed and not much will be left to stimulate the large intestine or defecation. Toy breeds of dogs and cats often receive very low residue diets.

Food can affect motility of the stomach and intestine in two ways. The first is by its bulk, and consequently its distending property. Canine diets containing a high percentage of undigestible material such as cereal, dog meals, agar, celluloses, bran, will be followed by the entrance into the colon of comparatively large amounts of material which will distend it and encourage defecation. Secondly, some foods aside from bulk-producing properties have a drug or stimulating action upon the smooth muscle and motor reflexes. Fresh fruits and vegetables and sometimes raw meats fall in this class.

Diarrhea is a common example of increased motility of the intestinal tract. It is characterized by abnormal frequency and liquidity of the stools. It means that material is being passed along the tract too rapidly for either normal digestion or absorption. This increased motility results from either increased excitability of the intestine or because of strong or unusual stimulation. Attempts to control it are directed toward controlling these factors. Control or remove the irritant, protect the mucosa from irritation and lower the irritability. To protect the mucosa from irritation, absorbents such as activated charcoal, bentonite, and kaolin are used. Substances which are thought to form a protective coating over the mucous membrane such as a bismuth subnitrate or subcarbonate are also used. Paregoric diminishes peristalsis and increases the tone of the sphincter valves. The diet should be bland and contain highly digestible ingredients, *i.e.*, low residue diets such as meat and milk. In some cases it is advisable to discontinue all types of feeding except parenteral. Parenteral feeding is also advantageous in that it serves to prevent or correct dehydration. These same dietary principles should be applied in patients subjected to surgery of the intestinal tract, especially if it involves the colon, rectum, perineum, anus, anal sacs, or pelvic viscera.

Constipation may be defined as a condition in which fecal material remains too long in the digestive tract. Is constipation a common clinical entity in dogs? Is widespread use of purgatives indicated?

Actually the frequency and size of the stools are not an index of constipation. There is a wide range of variation with respect to alimentary habits. There is recorded a case of a man who went from June 18, 1900 to June 21, 1901 of the following year without a bowel movement. Of course, this was constipation and cleaning out the colon was not too simple a procedure. The opposite extreme is the case of the professor who, when aked to what he owed his healthy appearance, replied that from his shack to the University there were 24 privies and that he always tested himself in all of them.

Actually, we believe we have seen some so-called constipation cases in dogs in which there may have been no movement or only fragmentary movement for periods as long as six months. We have treated such cases by using mineral oil *per os* and rectum for one to three weeks. Water enemas were also employed several times daily. Digital rectal manipulation also assists in breaking the mass down. All of the mass is eventually passed. This regime has only failed once and that failure attributed to too vigorous instrumentation on the part of an eager student.

In a carnivorous animal, if highly digestible food, meat, and milk is ingested the feces are not derived from the ingested food but from the secretions of the glands along the alimentary canal. The feces during starvation do not differ materially from those when food is taken except to be diminished in amounts because of decreased stimulus for secretions. Usually diets contain undigestible substances in varying amounts which affect fecal bulk. Consequently, the size of stools and frequency of defecation are conditioned by the food eaten and vary greatly in different, normal individuals.

Sometimes the abnormality of stools can be traced to disturbance in secretion of digestive glands. The liver bile normally enters the small intestine in appreciable amounts. A 20-lb. dog may secrete as much as 200 cc. of bile per day. Bile is important for the digestion of fat and also is responsible for the normal stool color. If the bile tracts are obstructed the stools are fatty and pale in color. The dog will also be jaundiced. A failure of pancreatic secretions will also change the character of the stools. They are voluminous, fatty, foul

smelling, and frothy. Such animals are often emaciated and may show diabetes mellitus as a complicating factor.

Defecation is a reflex act, which is unique in that it is subject to voluntary control. Distension of the rectum, by the sudden entry of feces gives rise to the desire to defecate. Often the entrance of food into the stomach sets up, in normal individuals, a peristalic wave which reaches the distal part of the colon. This causes the movement of feces into the rectum and explains the often noted defecation following feeding. In house broken individuals, if the reflex is voluntarily inhibited, the rectum adjusts its capacity to the bulk of the feces and the pressure stimulus is abolished. Regular opportunity should be provided for defecation if constipation is to be avoided.

On the basis of these remarks and other facts, treatment of constipation would consist of: (1) A diet having sufficient indigestible residue for normal stimulation of the colon, (2) regular opportunity for heeding the defecation reflex, (3) maintenance of adequate fluid intake to keep bowel contents at proper consistency, (4) exercise to maintain good general muscle tone, and (5) medication to promote normal defecation. The latter would include lubricants, irritants for peristaltic activity, parasympathetic stimulants, bulky products, et cetera.

Megacolon as such probably does not occur in dogs. In the human it is a disease of children. Formerly it was believed to be the result of an imbalance between the sympathetic and parasympathetic nervous system. Presently it is believed to be due to a congenital absence of intrinsic nerve tissue. Successful correction consists of removal of the affected portion.

Another interesting abnormal motor disturbance of the gastrointestinal tract is that of pylorospasm. It occurs occasionally in young dogs under 1½ years and most often under six months of age. The usual history is that of vomiting fluids or liquid material immediately after ingestion. Solid foods are usually retained. Spasm of the pylorus is the prominent feature. However, some irritation or enteritis may also be present. The important thing in treatment is to remember that the parasymathetic nerves are the motor nerves to the pylorus, stomach, and intestine. To abolish this pyloric spasm some parasympathetic paralyzing agent is needed. Atropine sulfate, 1/150 gr. is a good one. It is cheap, and stable in aqueous solution. It is usually given orally about 30 minutes before feeding. Other intestinal antispasmodics like syntropan 50 mg., transentine, 75 mg., novatropine or metropine may be used. These latter agents may be desirable in some cases at least, since they have lesser effect on smooth muscle and glandular structures outside the gastrointestinal tract.

Vomiting is an unusual motor disturbance of the gastrointestinal tract. It is one of the most primitive protective functions with which animals are endowed. It may be as simple as overeating or signal approaching death. It is one of the chief signs of drug toxicity regardless of the route of administration. In some instances it serves no useful purpose and is often deleterious to the body. It is a reflex act involving a reflex center receptors, sensory, and motor nerves. The complex series of movements which occur during vomiting are controlled by the reflex center (vomiting center) which is actually a group of nerve cells in the medulla. Sensory impulses which may stimulate this center and produce vomiting can arise in the stomach and other parts of the alimentary tract. They may also arise in practically all other visceral organs including; heart, uterus, pharynx, kidney, bladder, gall bladder, eyes, nose, and inner ear as in car and sea sickness.

Also certain drugs including; morphine, apomorphine, picrotoxin, substances such as histamine, choline, and possibly other identified toxins arising in the course of disease in the body, may make the cells of the vomiting center more sensitive so that the normal impulses which reach them are sufficient to cause vomiting. The point to remember is that vomiting does not imply a primary disturbance of the gastrointestinal tract. Dramamine is recognized as a fairly successful drug in depressing the cells of the vomiting center. As Alvarez says; "Sometimes it doesn't pay to pour water on the fire alarm."

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Use of Isotopes Spreading Fast

The Atomic Energy Commission reports that since 1946 the number of medical uses of isotopes — hospitals, research groups, physicians, and others — has doubled every two years. As of the first of this year, it was more than 850 and is expected to be 5,000 by 1960.

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A human leptospirosis vaccine is under study in Italy where the incidence of this disease among rice field workers is high.

Factors To Be Considered In Creating And Dissolving A Partnership†

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THE problem of creating and dissolving a partnership is a subject having many and varied complexities. Its scope is broad and ramifications many. This is no news to you who have attempted to draw up a suitable partnership agreement. At this time, I would like to state that those who are operating as a partnership should definitely have a written partnership agreement. The main points to be considered in entering into such a contract are as follows:

1. Name of business.
2. Term of partnership.
3. Capital.
4. Profit and loss.
5. Salaries and drawings.
6. Interest on capital.
7. Management, duties, and restrictions.
8. Banking.
9. Books.
10. Termination.
11. Death.

Name of Business. The name of the business, I believe, is very important. Most everyone attaches an egotistical value to his own name, but because of the growth and continuance factor of your particular business, I believe, it a good idea to have an impersonal name for your business establishment.

Term. The term of your partnership is the length of time it is to be carried on.

Capital. The capital is the amount that each partner is to contribute to the firm.

Profit and Loss. The profit and loss is the method under which the profit and loss is divided.

Salaries and Drawings. In many instances salaries are paid to partners in various amounts and treated as expenses before distribution of profits.

Drawings also are set up with limitations and amounts.

I usually like to have included in a partnership agreement the provision that drawings will be made as mutually agreed to, in order to meet the changing times and changing needs.

Interest on Capital. It has been said that, other than the personal problem in a partnership, the aspect of the division of earnings to capital and personal services is a great problem and one that causes serious difficulty. I think it is quite essential to give consideration to the payment of interest on capital as it is not always expedient to keep the captital accounts on a pre-arranged basis.

I wish to state to those of you who are thinking about retiring from your business; or who are interested in sharing some of your responsibilities and efforts; or you who are interested in becoming a part of one of the larger businesses seek the best qualified advise regarding proper procedure. As a rule, a young man graduating from college and starting in business has no money and with the high cost of getting a proper animal hospital it is impossible for him to start in business for himself. If you hire him at a salary, and he is the type of person that you want him to be ambitious, progressive, and energetic, then he will not be working for you very long. If he is an aggressive individual he will be interested in extra earnings which extra endeavors might produce, and by creating an incentive and interest in the business you will automatically create extra interest which, in turn, will help you as well as him.

I have built up a chart to show you how it is possible to have this individual taken into your business and acquire an interest in it as he works from year to year. (See table 1).

Management, Duties, and Restrictions. This portion of the partnership states what duties and management responsibilities, as well as, the restrictions as to the things that a partner can do.

Banking. This part of the agreement relates to the handling of the money.

Books. Refers to what books are to be kept

†Presented at the 22nd annual meeting of the American Animal Hospital Association, Detroit, Mich., May 4-7, 1955.

*President, Edwards Accounting Service.

and the manner in which they are kept. I want to stress the importance of keeping good records, not only for tax purposes, but for accounting to each other.

Termination. This section determines how a partnership is to be terminated and in the event of termination how the assets are to be distributed. With the larger amount of physical properties which are being acquired by your businesses the location becomes of prime importance.

In my experience and because of human nature, many partnerships are terminated because of disagreement of some kind or other. In many instances, both of the partners are desirous of retaining and continuing the business on their own behalf.

I have seen settlements where one partner sets the price and the other decides whether he wants to buy or sell. This seems to be an equitable way of settlement as the person setting the price does not know whether he will receive that price or will have to pay it.

It is well to have your attorney make provision for the wives of the partners to agree to release their dower interest in all the assets and sign the partnership agreement along with the partners to insure them of carrying out this provision.

Death. In the event of death of any partner the problems are many. Whether the survivor has the first chance at buying the deceased's interest or whether it becomes mandatory that he buy it. The price that he will pay and whether goodwill is to be considered at arriving at the purchase price. Many times the price is redetermined from time to time as the partnership continues so that in the event of death the survivor knows what he must pay. In order to protect surviving partners, so that the partnership will not have to be sold to other parties, there are many arrangements of life insurance whereby each partner buys a policy on the lives of the other partners. And upon death the principle of this will be paid to the surviving partner. Any of your insurance agents will be only too glad to discuss this with you. This provides the surviving partner with the funds with which to buy the deceased partners' interests. While it appears that the surviving partner has gained a windfall it also protects the deceased partner's interest in as much as it insures the payment to his beneficiaries. If no provision is made for insurance of this kind, some arrangement should be made in your partnership agreements to provide for the purchase of the business by the surviving partner over a period in order not to over-burden him with obligations.

Books could be written about partnerships and the problems and difficulties that arise with partners. It is hard to enumerate the order in which the problems occur but without doubt, personality is the greatest one. A partnership is like a marriage except that there

TABLE 1. Partnership Distribution of Income

ASSUMPTIONS: A and B are Partners of equal interest Earnings per year — $30,000.00	TOTAL	INVESTMENTS PARTNER A	PARTNER B	PARTNER C
Investment in Business — Beginning	$100,000.00	$50,000.00	$50,000.00	$ -0-
Add: Earnings for First Year	30,000.00	11,000.00	11,000.00	8,000.00
	$130,000.00	$61,000.00	$61,000.00	$ 8,000.00
Less: Drawings for First Year	30,000.00	13,000.00	13,000.00	4,000.00
Investment — End of First Year	$100,000.00	$48,000.00	$48,000.00	$ 4,000.00
Add: Earnings for Second Year	30,000.00	10,880.00	10,880.00	8,240.00
	$130,000.00	$58,880.00	$58,880.00	$12,240.00
Less: Drawings for Second Year	30,000.00	13,000.00	13,000.00	4,000.00
Investment — End of Second Year	$100,000.00	$45,880.00	$45,880.00	$ 8,240.00
EARNINGS DISTRIBUTION:		EARNINGS		
First Year:	$ 30,000.00			
6% Distribution on Excess Investment over Lowest Investor (6% of 50,000)	6,000.00	$ 3,000.00	$ 3,000.00	$ -0-
Balance of Income Distributed Equally	$ 24,000.00	8,000.00	8,000.00	8,000.00
		$11,000.00	$11,000.00	$ 8,000.00
Second Year:	$ 30,000.00			
6% Distribution on Excess Investment over Lowest Investor (6% of 44,000)	5,280.00	$ 2,640.00	$ 2,640.00	$ -0-
Balance of Income Distributed Equally	$ 24,720.00	8,240.00	8,240.00	8,240.00
		$10,880.00	$10,880.00	$ 8,240.00

are more binding ties to a marriage and it is easier to reconcile differences in marriages as they occur.

Rules for Tax Estimates

When declaring your estimated tax you must follow a set of rules laid down in the 1954 Revenue Act. These may work out helpfully for some taxpayers, but they are primarily designed to change the habit of those taxpayers who in prior years made only nominal estimates and payments on March 15 and then picked up the under-payments on January 15. Now each installment of estimated tax must stand on its own feet.

Four new safety zones are set up for figuring your estimate. Where your payments fail to fall into any safety zone, then the "general rule" applies to the effect that *each* installment must be based on an estimated tax which turns out to be at least 70% of the tax shown on the 1955 return.

If your quarterly installment payment comes under any one of the following tests, you will not be subject to the 6% penalty:

1. Pay an amount each quarter equal to one-fourth of your actual tax returned for the previous year. If you do so, no penalty can be imposed, even if your current tax should exceed your previous tax.

2. Pay an amount equal to the tax computed on previous year income but using current rates and exemptions. This is the same as 1 above, except where you have a change in (a) rates, (b) exemptions or (c) income splitting.

3. Pay an amount equal to 70% of the tax computed on the basis of the taxable income for the months in the taxable year ending before the month in which the installment is due. Here you place your taxable income on an "annualized" basis. Assume, for example, that your taxable income up to March 31, 1955 is $3,000. Dividing this by three and multiplying by 12 results in an annualized income of $12,000. If you are single and have no dependents, the tax on $12,000. would be $2,792. You will invoke no penalty if you pay ¼th of 70% of this amount, or $488.60, by April 15. For each succeeding installment, the process will have to be repeated, using taxable income up to the end of the month before the particular installment is due.

4. Pay an amount equal to 90% of the tax computed at current rates on the actual taxable income for the months in the taxable year ending before the month in which the installment is due. *Here no "annualization" is required.* Suppose your taxable income is the same as in 3 above. The tax on $3,000. for a single person is $442.00, which is figured as if the $3,000. were the entire year's income. There is no penalty if the installment equals at least 90% of $422.00, or $379.80. If by May 31st your income is $8,000, then your tax would be $1496, and 90% of this is $1,346.40. Thus your June installment would be $1,346.40 less $379.80 paid the first quarter, or $966.60.

Remember that each installment is safe from penalty if it comes within any one of these four safety zones, which may be summarized thus:

1. ¼ of prior year's tax.
2. Same as 1, except where rates or exemptions have changed.
3. 25% of 70% of annualized taxable income, brought up to date each quarter.
4. 90% of tax based on actual taxable income, brought up to date each quarter.

Under the previous law the penalty for underestimating was based on the correct final tax after examination, whereas now the penalty is based on the tax as shown on the return. Moreover, the penalty is not a straight 6% of the deficiency as under prior law, but is 6% per annum. It is called "interest" and is computed like interest but it is not deductible.

It is impossible to eliminate an underpaid installment by overpaying a later installment, but such overpayment will stop the running of the 6% interest on such underpaid prior installment.

Here is how the penalty works: Assume that the 1955 return filed April 15, 1956 will show a tax of $10,000, that $1,000. was paid on each of the first three installments by withholding and declarations and that $4,000. was paid on the final January 15 installment. Since the amount of tax paid in each of the first three quarters is less than ¼ of 70% of the final tax reported, the general rule would apply. The amount of the penalty would be computed as follows:

1. Tax liability	$10,000
2. 70% of tax liability	$ 7,000
3. ¼ of 70%	$ 1,750
4. Quarterly prepayment	$ 1,000
5. Quarterly underpayment	$ 750
6. Computation of penalty:	
(a) 1st Quarter — 6% of $750 for 275 days to 1/15/56	$ 33.90
(b) 2nd Quarter — 6% of $750 for 214 days to 1/15/56	26.38
(c) 3rd Quarter — 6% of $750 for 122 days to 1/15/56	15.04
TOTAL PENALTY	$ 75.32

(Continued on page 716)

Some Clinical Uses Of Prednisone In Dogs

R. B. KOGER, D.V.M., Joplin, Missouri

METICORTEN®[1] is a new, potent, adrenocortical steriod which is said to be three to five times as effective as cortisone or hydrocortisone on a milligram-for-milligram basis.

This new agent has been found to be effacious in the treatment of the so-called "summer eczema" syndrome and in other abnormalities which will be outlined in case reports. Non-specific dermatosis is a common skin condition in dogs in the warmer sections of the country during summer months. Many theories have been advanced as to the cause of the condition including: Allergy, grass or weed fungus, rudimentary sweat gland involvement, dietary errors, and others. Whatever the etiology, typical symptoms are: Intense generalized pruritus with resulting alopecia of parts or all of the body, hyperemia of the skin, and finally a moist eczema from the trauma produced by the scratching and biting. A differential diagnosis to distinguish eczema from mange can be made by skin scrapings and by observing other symptoms such as the "mousy" odor usually associated with demodectic mange. In this area, the condition appears early in the spring and ceases after the first killing frost. This second occurrence appears to give credence to the fungus or allergy theory as the etiological factor. Even if warm weather returns following the frost, eczemas do not recur.

The following are representative cases of a series of over 300 dogs treated with meticorten during the past five months. In each instance, except where otherwise noted, a single dose of approximately 1 mg. per lb. body weight was administered intramuscularly.

Case 1. Two Boston Terriers, litter mates, four years of age, male and spayed female. The male had a mild case of eczema, the female a moderate degree, but both were scratching incessantly. Both were given meticorten. The owners reported that the male stopped scratching in 24 hours, the female in about 36 hours. A report from the owners five weeks later indicated that they were completely "scratch free".

Case 2. Mixed Setter, male, 8½ years of age was presented suffering severe and advanced summer eczema. Relief from intense pruritus was complete within eight hours after treatment. The animal was given one seleen®[2] bath by the owner and presented again in three weeks with a recurrence of the scratching although the appearance of the skin and hair was much improved. Another 50 mg. dose was given. The owner reported relief "within hours" after the second treatment. She also advised that the dog now had a ravenous appetite and played like a pup. (Incidentally, other owners have commented on the increase in the animals' appetites after treatment with meticorten). Examination four weeks after treatment revealed considerable improvement of hair coat.

Case 3. A valuable female Labrador, three years of age, was presented with a history of some scratching but the owner was most concerned about the loss of patches of hair at various places on the body, particularly the head and neck. This bitch had a history of previous attacks of the same nature earlier in this summer and in previous years, which had been controlled but not cured, by weekly seleen baths. One 60 mg. dose of meticorten was given and there has been no recurrence after a two-month interval. The owner, a rather fussy individual about his prize dog, asked me about six weeks after the treatment: "What did you do to Melanie? She is in the best shape I've ever seen during summer."

Case 4. Mixed terrier, female, ten years of age. This dog was an annual summer problem. Recurrence had been regular with the advent of summer temperatures for nine years. Medicated baths had given some relief. Meticorten (20 mg.) given at three-week intervals have kept this animal entirely "scratch-free" for nearly four months.

Case 5. Dachshund puppy, nine weeks of age. This puppy was first brought to the hospital for treatment of tonsillitis. At that time, the submaxillary lymph glands were slightly swollen, the temperature was 103.8 F. and the tonsils grossly inflamed and swollen.

[1] Schering Corporation, Bloomfield, N. J.

[2] Abbott Laboratories, North Chicago, Illinois.

The puppy was given sulfanomides at therapeutic levels for two days and the throat was painted three times daily with neoprontosil. On the third and fourth days the animal was given 200,000 units of penicillin with ¼ gm. of dihydrostreptomycin in addition to the other therapy. By the fifth day, temperature had returned to near normal, but other lymph glands were noted to be swollen. The submaxillary glands were badly swollen and painful, and the prescapular glands were perceptibly enlarged. The inguinal and popliteal lymph glands were slightly enlarged. A hematological study was made showing: Hg. 13+, RBC 6,900,000, WBC 19,000, neutrophiles 72, eosinophiles 3, lymphocytes 24, and monocytes 2. A diagnosis of lymphangitis was made and 10 mg. of meticorten administered. The following morning the lymphatics were noticeably decreased in size. No further treatment was given and the pup was discharged two days later. All lymph glands had returned to normal and general condition was good.

Case 6. Pekingese, male, eight years of age. The dog was presented with an obscure lameness of the left front leg of two weeks duration. Examination failed to produce a positive cause of lameness and a tentative diagnosis of arthritis was made. A therapeutic dose of meticorten was given and the dog hospitalized for observation. The next day, no noticable improvement was evident. The following day, however, the dog was using the leg with complete freedom. The dog was examined about three weeks later. Lameness has recurred and treatment was repeated, which was followed by relief of symptoms.

Case 7. Chihuahua, female, five years of age. This animal exhibited alopecia totalis when first presented. The feet were so badly affected with eczema that the animal walked with difficulty — with advanced perionychia of several toenails. One 10 mg. dose of meticorten was given. The licking and chewing of the feet stopped within 24 hours. The drug was given at two weeks intervals for three treatments after which the feet and toes were practically healed and the animal had started the growth of new hair on most of the body.

Cases 8 and 9 Two Sealyham Terriers, male three years of age, and female two years of age owned by individuals from two separate communities. These animals were presented exhibiting typical chronic fungus otitis externa and otitis media. This condition is common in this practice in the long haired members of the Terrier group. It is characterized by a gummy, foul-smelling, yellowish exudate in the ears, and a scaly thickening of the ear flap. The male Sealyham was hospitalized and given one 25 mg. dose of meticorten. The ear canals were cleansed and the hair trimmed. Variton® ointment was massaged into the ear flap and into the ear canal twice daily. The animal was dismissed in six days with the ears completely free of exudate and odor. The female was treated in the same manner as an outpatient on September 2nd. When returned on September 15th the ears were completely healed, but a second dose of meticorten was given as a precautionary measure.

Case 10. Cocker Spaniel, male, 14½ years of age (owned by an *x*-ray technician). This case was possibly the most miraculous recovery of any treated. The dog had developed an eczematous elephantitis of the skin of the abdomen, hind legs, and feet over a year earlier. Sebaceous secretions in the thickened folds of skin were an incubator for staphylococcus bacteria with a resulting putrefaction and foul odor. Numerous treatments were tried, including *x*-ray therapy by the owner, with only pallative results. Finally, the owner's wife brought the dog in with the request for euthanasia. She was persuaded to try the meticorten treatments on the animal and left him with us for one week. Two doses of 30 mg. each were given three days apart and a seleen bath removed the secretions. The dog was sent home much improved. When returned in 10 days the owner was elated with the changes in his pet. The odor was gone, the skin was much improved, and general condition and spirits excellent. An additional dose of 25 mg. was administered at this time when the owner remarked: "I guess you might just as well vaccinate him for rabies and license him, Doc. Looks like we are going to have him around for a while longer."

Surgical Cases

Meticorten has been used with apparent success in the handling of shock and stress following major surgery or severe injuries. It has been used in the same manner, *i.e.*, 1 mg. per lb. body weight and repeated as indicated. It is our feeling that meticorten has been of benefit in saving animals which have had to undergo long or difficult surgical procedures, especially in older patients and when given as early as possible preoperatively. Precautions that are observed with cortisone must be followed with meticorten, although in our experience side reactions are negligible. Several

owners have complained that their animals exhibited a polydipsia and a polyuria for three to five days following treatment. The use of a small pinch of salt in the drinking water appears to obviate this difficulty. The ravenous appetite mentioned before is more pronounced in the older patients and is apparently due to the euphoria the animals seem to feel after the treatment*.

The uses of meticorten described have been with intramuscular injections of the aqueous suspension containing 40 mg. of the drug per cc. The drug is absorbed slowly to give prolonged effect. "It has been the finding of the majority of physicians, using both the oral and intramuscular preparations, that the oral form is perhaps a little more effective"[1].

Summary

1. Meticorten appears to be highly effective in the control of the so-called "summer eczemas" of dogs.

2. Meticorten is valuable in any stress condition after the primary infection has been controlled.

3. Meticorten is a relatively safe drug in therapeutic dosage and is a valuable addition to therapeutic agents available for treatment of obscure conditions.

REFERENCES

1. Siegrist, J. C., Director, Department of Veterinary Medicine, Schering Corporation, Bloomfield, New Jersey. Personal Communication.

2. Raneche, Berton, Ten Feet Tall. *The New Yorker Magazine*, Sept. 10, 1955 (from Annals of Medicine).

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"A ship without a cat is a ship without a sail," is an expression used by old sailors. Cats earn their passage by destroying rodent menaces.

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An average man would appear 15 miles tall if he could be placed under an electron microscope that magnifies 12,000 times.—*S. N. L.*

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Transmission of virus diseases by inhalation may be the most important method of infection in such diseases of man as psittacosis (ornithosis).

*Cortisone, and to a lesser degree ACTH, produce an euphoria and an exhilarated feeling which, if carried to the extreme by overdosage can induce in the human patient, a manic-depressive psychosis. A graphic illustration of this occurred in a patient under treatment for periarteritis nodosa. He was receiving an experimental dose of 250 mg. of cortisone daily and is quoted as saying he felt like he could eat 100 meals a day and that he was ten feet tall[2].

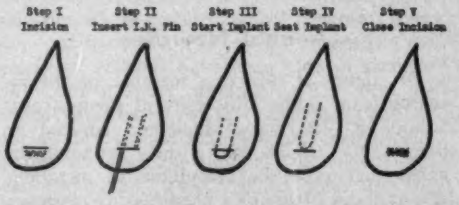
Implants for Defective Cartilages in Cropped Ears

R. C. VIERHELLER, D.V.M., Whittier, California

The method for correction of faulty ear carriage in dogs has been used in our practice intermittently for over four years. Since it has its weak points we have tried all other means that have come to our attention. In each case we have returned to the following as the most effective measure in our hands.

We make our implant out of 17 gauge stainless steel wire. A piece is bent to the shape of an old fashined hair pin or elongated staple. Generally the implant will be about 1¼ in. long, but never any longer than just sufficient to support the weakness in the ear. The spacing between the tines of the implant should be about ¼ in. The ends of the wire are buffed smooth with a carborundum stone.

The location for insertion of the implant is just above the heavy transverse ridge of cartilage at the base of the ear. An incision is made transversely at this point slightly longer than the width of the implant. Cut through skin and somewhat into the cartilage as well.



Undermine the incision above and below to facilitate closure of the wound after insertion of the implant. The tracts for the tines of the implants are preformed by the use of a small gauge intermedullary pin (one slightly larger than the gauge of the implant). The tracts are made as deeply into the substance of the cartilage as possible to insure against the possibility of the points breaking through. The implant is pushed into place, and the small incision is closed with two or three small interrupted sutures.

Some of the ears we have corrected by this method have been able to carry the implants for years without complications arising. The first one done was on May 13, 1951. Both ears were involved, and the dog, a Boxer, still carries the implants, and still has presentable ear carriage. A few have broken through the skin on the inside of the ears after a few weeks or months. In some of these the cartilage

had stiffened sufficiently to permit removal of the wire without the ears dropping. In at least one it was possible to cut off the protuding bit of wire, and the skin again healed over the defect.

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Partnership Agreements

(Continued from page 712)

As stated above, the penalty is not deductible as interest paid. On the other hand, some taxpayers may find it more advantageous to pay the penalty than to borrow the money to pay the tax.

Also pertaining to income taxes; remember that you are entitled to all expenses that further your earning of income including traveling expenses, expenses pertaining to a portion of your home that is used for business, convention expenses, and entertainment expenses that are in connection with your business and that are expected to further income in proportion to expenditures charged for business promotion.

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Animal Neuroses

Dr. James H. Mark, a member of the research team at the University of Pennsylvania School of Veterinary Medicine, reported on preliminary studies on a new tranquilizing agent that promises usefulness in metabolic disturbances of animals classified as neuroses.

Clinical trials with the new agent, chlorpromazine, in horses and dogs were cited by Doctor Mark at the Pennsylvania State Veterinary Medical Association meeting recently as effecting alteration from abnormal behavior in a mare that refused to nurse a foal and in two dogs whose behavior had become abnormal or neurotic.

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Archie Mourey, Williamsport, Pa. has a 28-year old rooster which he believes is the oldest in the United States. He has had the fowl as a pet for 11 years, and it was owned previously by a neighbor for 17 years.—*Poultry Tribune*, March, 1955.

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Broiler raising was started in Belgium on a commercial scale 100 years ago, and is one of that country's major industries.

The Porch Rocker

A veterinarian's wife was overheard to remark recently that she missed the pleasant evenings of 30 years ago when the family gathered on the porch to visit among themselves or with neighbors and friends who happened to drop by to inquire about them or relay a bit of news or gossip. The porch rocker was then a symbol of leisure and tranquility, now lost and replaced by a powerful automobile, the radio, and television.

Not so long ago an evening at home was a restful period, a time for quiet meditation, for analysis, a brief respite from business problems, a time for reading or self-improvement. It appears that these things have been sacrificed in the rush and confusion of today. The porch has been converted to a garage, and the rocker relegated to the attic or woodpile. Today, there is a radio or television in the kitchen, living room, and bedroom, one or more of which take over. There is less time now for quiet thinking or reading. No other equipment in the home gets as prompt attention of the service man when it fails to perform as intended.

"Our daughter turns on the radio in her room before she gets out of bed in the morning", the wife continues, "selecting a station featuring the latest (and hottest) dance recordings. The same radio is the last thing to be turned off at night. A set in the kitchen plays an agonizing 'voodoo' beat at breakfast and after dinner while the teenager helps with the dishes. Either the radio, television, or both seem indispensable during preparation of home work."

Progress, indeed, must go on, but the question also arises as to whether this modern day motion and speed should eclipse completely the slower tempo of the rocking-chair day, states *Office Executive* for July 1955. Concern is growing among physicians that many ills stem from the rush of "modern" living. It is a mistake to sacrifice, or obliterate in the rush, the occasional interval of quiet.

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In the summary of a recent report, (*Jour. Am. Med. Assn.*, August 13, 1955) on the effect of cobaltous chloride in the drinking water of tumor-bearing rats, it is stated that "The administration of cobaltous chloride, at the dosages used, significantly retarded the growth of a transmissible firbrosarcoma."

PUBLIC HEALTH

JAMES H. STEELE, D.V.M., M.P.H.
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Progress in Animal Disease Control in Europe

During May and June of 1955, while at the World Health Organization's European office as a member of the Expert Advisory Committee on Veterinary Public Health, I had the opportunity to observe the progress of veterinary medicine in England, France, and Germany, and to hear about conditions in other countries in Europe. The following observations were made:

Tuberculosis

In the immediate years following World War II, bovine tuberculosis was a major public health as well as economic problem in most parts of Europe. In recent years, Finland and Norway have reported that the disease has been eliminated in their countries. Sweden, Denmark, and Great Britain have made substantial progress in eliminating the disease. The Dutch health officials report that almost 90% of Holland is now tuberculosis free. West Germany has inaugurated a program for control and hopes that within 10 years it will be reduced to the point where it is no longer a public health or economic threat. Early in 1955, France reorganized its tuberculosis eradication campaign. In the future they will use the tuberculin test for detecting and removing infected animals. BCG (Bacillus Calmette-Guerin), which was formerly used throughout France for vaccinating cattle, will no longer be used in any official programs. Italy will continue the use of BCG inasmuch as they do not have resources to attempt to eliminate tuberculosis reactors. Veterinarians who visited Spain recently said there was a high incidence of disease in that country but that the government was making plans to develop a control program. Officials who have contacts in Eastern Europe state that the incidence of bovine tuberculosis has not changed in that area.

Public health statistics indicate that bovine type tuberculosis in man has almost disappeared in the Scandinavian countries and the incidence has dropped precipitously in Great Britain. Germany also reports a decline.

Recent reports from Germany indicate that pasteurization as practiced in that country does not always destroy all of the bovine tubercle bacilli in the milk. Similar information also has been received from French veterinary medical authorities. Public health officials in countries where there is a high incidence of bovine tuberculosis among dairy animals recommended that all milk be boiled.

It is surprising to note that there is some opposition to bovine tuberculosis eradication in scientific circles. The arguments against eradication of bovine tuberculosis are that if it is eliminated in animals, then man does not have the opportunity to develop resistance to the disease and hence is more susceptible to the human type disease. This argument has been advanced in all of the northern European countries where disease control programs have been inaugurated. In most instances, the veterinary officials have been able to successfully combat these arguments. The best argument against it is that the incidence of human tuberculosis has dropped dramatically in the areas where bovine tuberculosis has been eliminated. This does not infer that the elimination of bovine tuberculosis has been the true cause, but it does indicate that elimination of the disease has not made the human population more susceptible.

Fight Against Bovine Tuberculosis—Switzerland

At the end of 1954, 68.2% of the 162,000 herds of cattle in Switzerland were free from tuberculosis. Application of new legislation is expected to eradicate the bovine form of the disease completely by 1958. Prof. G. Fluckiger, director of the Federal Veterinary Office in Bern, estimates that the annual loss caused by bovine tuberculosis is 20,000,000 Swiss francs. Formerly, in Switzerland, 8 to 10% of cases of human tuberculosis were caused by *Mycobacterium tuberculosis bovis*. It is estimated that the loss to the Swiss economy caused by human tuberculosis varies between 130 and 150,000,000 Swiss francs a year (compared with 780,000 francs lost as a result of

bovine brucellosis). Human tuberculosis of the bovine type no longer exists in regions where tuberculosis has been systematically eliminated in the herds, and thus, in the future, a saving of about 12,500,000 francs can be expected in the expenses of the campaign against tuberculosis in human beings. Up to the end of 1954, about 200,000 head of tuberculous cattle were slaughtered. Since the indemnity for each animal that must be eliminated is no more than 80% of its value, the loss to owners of livestock was about 40,000,000 Swiss francs.

Brucellosis

The incidence of brucellosis is high in all of western Europe except in those areas where a vigorous campaign has been followed in an effort to eliminate the disease. Brucellosis has been eradicated in Norway, Finland, and nearly so in Sweden and Denmark. The Norwegian authorities have stated that the cost of the campaign to eliminate the disease was less than the annual loss of animals and dairy products attributable to Brucella infections. Great strides are being made in Great Britain toward the reduction of this disease. A new laboratory has been built at Weybridge, the British veterinary research station, for the production of strain 19 vaccine. Strain 19 vaccine is used in most parts of Europe, including many of the eastern countries. Germany is attacking brucellosis simultaneously with tuberculosis, and they expect to bring it under control within the next decade. A new problem, *Brucella melitensis* infection, has appeared in sheep in west Germany. This has been traced to the importation of sheep from southern France during the war years. A number of human infections and deaths have occurred during the past decade. The present German policy is slaughter of flocks in which infection has been recognized.

The prevalence of brucellosis continues to be high in the Mediterranean countries where the highest numbers of human cases are reported in Spain, southern France, Italy, and Malta. A few years ago the incidence of *B. melitensis* reached such a high level in Yugoslavia that drastic measures had to be taken. The slaughter of infected sheep and goat flocks along the Adriatic Sea has reduced the incidence of disease in that area.

Rabies

This ancient disease has been eliminated in many parts of western Europe. No confirmed cases have occurred in Great Britain, except in animals under quarantine, since shortly after World War I. This speaks well for having a rabies quarantine program. All dogs entering Great Britain must remain in quarantine for at least six months; in some instances they are held longer when there is suspicion that they may have been exposed. Norway, Denmark, and Sweden also have been free of rabies for many decades. In 1953, when rabies was reported in northeast Germany in the Russian zone not too far from the Danish-German border, the Danish veterinarians took steps to prevent its possible introduction into their country. This program included vaccination of all dogs within 20 kilometers of the border and the reduction of wild life along the border. Finland, another country which had been free of rabies for many years, had a problem develop along its Russian frontier in 1952. They instituted a vigorous campaign in a zone 50 kilometers deep, which included vaccination of all dogs, destruction of unclaimed animals and reduction of wildlife. Since then a few sporadic cases have appeared in the southeastern part of Finland, but fortunately, the disease has not spread.

Rabies was a problem in Belgium and Holland immediately following the war but was eliminated in 1947 and has not appeared since. West Germany has been threatened with the invasion of wildlife rabies from the eastern zone and a few cases have been reported in the western zone. This past spring the Hamburg Institute of Tropical Medicine reported a confirmed case of bat rabies in a bat found near Hamburg. The identification of rabies in this animal has stimulated interest in all countries that have been free of the disease. Most of these will probably carry on some investigations of bat populations to determine if the virus is present.

Switzerland has not reported any rabies in many years. Occasional cases have occurred in Austria. The disease is present in Spain, Italy, Yugoslavia, Greece, and all the eastern European countries. The Italians have had some successful rabies campaigns in the southern part of the country and in Sardinia. In these campaigns they have used tissue vaccine with stray dog elimination. The Italians do not believe they have any sylvatic rabies inasmuch as they have very few wild animals.

Hydatid Disease

This is an important problem in the Mediterranean countries, where the public health and economic tolls are unestimated. Thousands of

human infections are reported annually in Greece, Yugoslavia, Italy, and Spain. The disease also is present in central Europe and Great Britain where it appears to be a sporadic problem. In the control of this disease, it is important to eliminate all stray dogs, to denature or cook all offal that is not used for human food, and to enforce good slaughter house sanitation practices. It has been difficult for these countries to follow such a program but they all hope to intensify their efforts toward elimination of the disease. It is expected that echinococcosis may also have a wildlife reservoir in parts of Europe.

Q Fever

This rickettsial infection has been reported in Great Britain, France, Germany, Switzerland, Spain, Italy, Yugoslavia, Russia, and its presence is suspected in other eastern European countries. To date, the disease has not been observed in northern European countries. The incidence in Great Britain, Germany, Switzerland, and France, has been sporadic. In Spain, Italy, Yugoslavia, and Greece the disease appears to be endemic, occasionally reaching epizootic proportions. In these latter countries it is not only a public health problem but causes some economic losses such as abortion and decrease in lactation in sheep and goats.

Psittacosis

Psittacosis as a disease of pet birds has been reported sporadically from all the European countries. Nearly all the countries have restrictions on the movement of birds, both as imports and within their respective borders. There is a sizable bird industry in England, Holland, France, and Germany. The psittacine bird population of west Germany is estimated to be 6,000,000. When infection is identified in an aviary in west Germany, the entire flock is destroyed and the owner reimbursed at the rate of about 4 marks (82¢) per bird.

Investigations in France have revealed that other infections attributable to the psittacosis-lymphogranuloma virus group are present. Bovine encephalitis, and sheep and goat pneumonitis related to this group are also present in France. Feline pneumonitis has been reported throughout western Europe. Ornithosis appears to be common; pigeons, ducks, geese, and chickens have been found to be infected in both western and eastern Europe.

Tularemia

Tularemia, a disease which was first observed in western United States, and later in Asiatic Russia, now appears to have spread through European Russia into southeastern Europe. There have been a number of reports of the disease in Yugoslavia in the past few years, both in animals and in man. According to investigators, occurrence of the disease in southeastern Europe appears to have been a true geographical invasion.

Cowpox

Cowpox is a common disease in continental Europe. This supports the theory that cowpox only occurs in areas where smallpox is endemic or epidemic. The infection occasionally spreads to man, but more important, man seems to infect cattle. This is especially true when persons with fresh vaccinations come in contact with susceptible animals. Outbreaks of this type have been reported on numerous occasions.

Horsepox and swinepox (European type) are both closely related to cowpox and smallpox. No information was obtained on the frequency of these diseases in Europe. Sheeppox, which is not antigenically or morphologically related to the true pox group continues to be an important problem in southeastern Europe and Russia. In discussing this problem with a European investigator, it was pointed out that this was probably the first disease in which vaccination immunization was practiced. He stated that the Arabic herdsman has practiced the transfer of infected scabs to lambs for centuries. He postulated also that this practice might have led to similar procedures for immunizing man for smallpox, such as were practiced by both the Arabs and Chinese during the middle ages.

Foot-and-Mouth Disease

In 1955, foot-and-mouth disease appears to be at a low ebb in Europe. The disease appears to have epizootic cycles in which it moves from south to north. These cycles appear to develop in North Africa and move into France, Italy, Germany, and Scandinavia. Three years ago, in 1952, Finland traced an outbreak to feed which had been imported from Russia. The disease is a serious problem both in western and eastern Europe. Human infection is reported occasionally throughout central Europe. Veterinarians and farmers, as well as packing house workers, are occasionally infected. Professor William Geiger, Cologne,

Germany, presented a paper at the European Congress of Comparative Pathology on a human outbreak of foot-and-mouth disease. This outbreak occurred among workers in a slaughter house where foot-and-mouth disease vaccine was being prepared.

A good summary of human foot-and-mouth disease has recently been published in a German medical book, Handbuch der Innern Medizin in Infectious Diseases, Part I, published by Springer Verlag, 1952, pp. 781-788. This report summarizes all the substantiated human foot-and-mouth cases that have occurred in recent years. An excellent bibliography is given on p. 823.

Trichinosis

According to the information available, the incidence of trichinosis in northern and western Europe is low. All of these countries require the cooking of garbage, although it is difficult to say how effectively it is enforced except in Great Britain. There, in 1953, a serious outbreak occurred in Liverpool where 82 persons were infected. An account of this appears in the *British Medical Journal*, May 1, 1954 entitled An Outbreak of Trichinosis in Liverpool in 1953 by Andrew B. Semple, *et al.*

A considerable amount of raw pork is eaten on the continent in the form of various types of dried cured hams and sausage. These are tasty meats and are usually served as appetizers before meals. Much of the pork in Germany is examined for Trichina infection. I understand this practice is also followed in parts of Switzerland, Austria, and eastern Europe. There is very little extensive garbage feeding on continental Europe. This is readily understood when one realizes there is little garbage. The average household prepares fresh food every day and usually it is all consumed. There is no large amount of garbage from hotels and restaurants inasmuch as people usually consume all the food that is placed before them. This may explain the lower incidence of trichinosis in Europe.

Tapeworms

Beef and pork tapeworms, according to the official reports are rare both in animals and man. The fish tapeworm, *Diphyllobothrium latum*, is an important problem in Finland, Russia, and other parts of eastern Europe. Finnish authorities estimate that in some of the communities in the eastern part of the country, there is a 100% attack rate. This disease is attributed to the large amount of raw and semi-raw fresh water fish eaten. Fish of this type is either salt dried or pickled. No doubt if it stood long enough the parasites would die but often the fish is eaten within a short time after it is prepared. The control of this infection is difficult because of the multiplicity of carriers that discharge eggs. Man is one of the most important hosts, but bears, dogs, wolves, foxes, and other wild animals may also carry the adult worm and discharge eggs that eventually infect fresh water fish.

Salmonellosis

Many types of Salmonella infections are reported in animals and man in Europe. There appears to be a continuous cycle in animal to man, man to animal, of this infection. It is transmitted by contaminated food products, meat originating from diseased animals, and by water supplies contaminated with human and animal waste containing Salmonella organisms. Salmonella infections are considered to be the primary food hygiene problem.

The control of this disease as a public health and animal disease problem depends upon the elimination of the disease in animals as well as man. This is especially true in world areas where human infections can be readily spread to animals. Good packing house sanitation and inspection procedures, as well as refrigeration, are helping to reduce its public health aspects.

Clostridium Infections

In the past three years in Great Britain, a number of outbreaks of *Clostridium welchii* (type A) infections have been attributed to the warming over of meat products. This type of infection has likewise been observed on the continent of Europe. What the significance of this finding may be is difficult to determine at the moment, but it does further emphasize the danger of warming over meat, of leaving meat for an indefinite period on steam tables, and holding over meat products without proper refrigeration.

Leishmaniasis

Leishmaniasis is a fairly frequent disease in some of the Mediterranean littoral, being frequently reported in Spain, Italy, Yugoslavia, and Greece. A recent report in Italian literature states that DDT has been quite effective in eradication of Phlebotomus, the vector of Leishmania. This observation was made in connection with the antimalaria campaign. Similar DDT programs are now being instituted in non-malaria areas where leishmaniasis exists.

Veterinarians in Public Health

Veterinarians throughout Europe are demonstrating increasing interest in public health. The British Veterinary Association has undertaken a campaign to make veterinarians in Great Britain responsible for certain public health practices. Meat inspection there is not under the supervision of veterinarians, in most instances being under the supervision of sanitarians in local health departments. Germany has many veterinarians in public health positions; the chief public health official of the State of Hesse at the moment is a veterinarian, Dr. Carl Schultz, who visited the United States in 1954. Many local communities also have veterinarians in charge of their public health programs. The Public Health Service of Holland has a Veterinary Medicine Section that is concerned with the diseases of animals communicable to man. In Italy, the Ministry of Interior houses both the public health and veterinary services. These are two separate services with equal rank in the Ministry. The Spanish public health service has a veterinary section which is responsible for certain phases of food inspection and investigation of animal-borne human diseases.

One of the problems confronting veterinarians in Europe who are interested in veterinary public health, is where they can receive specialized training. At present, none of the public health schools in Europe accept veterinarians for graduate degrees. It is important that this problem be resolved inasmuch as it is exceedingly difficult for European veterinarians to obtain sufficient funds to study in North America.

The World Health Organization has prepared an excellent report on the veterinarian in public health. This report was prepared at the request of the European office of the World Health Organization. It will be published in the near future.

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Hydrocortisone in Mastitis

(Continued from page 682)

tices reassessed. Regardless of the trends, accurate diagnostic approaches and sound evaluation based on the knowledge of pharmacology, bacteriology, pathology, hygiene, and immunity still characterize good clinical practice.

Summary

A study of the results of the use of a new hydrocortisone and antibiotic mixture in a water-soluble, readily diffusible base in the treatment of local mastitis is presented. One hundred eighty-eight quarters were treated by the intramammary route. No conjunctive systemic therapy was attempted in this study, in order to obtain a better evaluation of the hormone. The results indicated that in acute mastitis, the convalescent time is reduced by approximately 25%, and the percentage of "cures" is higher by a minimum of 20%.

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Antifungal Antibiotic Claimed Safe and Broadly Effective

Two scientists of the Division of Laboratories and Research, New York State Department of Health, Albany, Dr. Elizabeth L. Hazen and Dr. Rachel Brown, were joint recipients of the first $5,000. Squibb Award in Chemotherapy in recognition of their discovery of nystatin, the first broadly effective, antifungal antibiotic safe enough for human use.

First made available to the medical profession last year by E. R. Squibb and Sons under the brand name mycostatin,® nystatin is proving to be of particular value for suppressing *Candida albicans* in the intestine and, in combination with tetracycline, for prevention and treatment of infections with these organisms which arise during or following oral administration of antibiotics active against pathogenic bacteria of the intestinal tract. Monilial infections of the mouth, vagina, and skin, as well as systemic moniliasis also have improved under treatment with the new antibiotic agent.

The nystatin-producing organism was discovered in a soil sample taken from a dairy farm in Virginia. Found to be a member of the genus Streptomyces, and believed to be a new species, the organism was designated *Streptomyces noursei.*

Nystatin is being supplied the medical profession by the Squibb firm in oral and vaginal tablet forms and also as an ointment. It is available in combination with tetracycline in capsule form as mysteclin®. Veterinarians, particularly those specializing in small animal practice, with others having diagnostic facilities or services available for identification of fungus infections of the skin, may find the new agent of service. Fewer unfavorable experiences are recorded in veterinary literature than in human medicine following oral administration of therapeutic doses of antibiotics. Nevertheless, some practitioners have observed what appeared to be establishment of fungus infections of the digestive tract following even low-level feeding of these agents.

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Gordeuk (*Poultry Tribune*, Feb. 1955, p. 66) estimates that the total annual loss to the poultry industry from common infectious diseases is $294,992,000. Leukosis leads the list with an estimated annual cost of $65,000,000.

Public Relations Program of Associated Veterinary Laboratories to be Extended and Enlarged

An increased public relations program to educate the public in the use of veterinary service has been announced for 1956 by Associated Veterinary Laboratories, Inc.

Through its news bureau, the American Foundation for Animal Health, the association will continue to disseminate news information on a national basis stressing the use of veterinary service in combatting livestock and poultry diseases. Timely educational articles and news briefs will be supplied to 50 farm magazines, 1,250 daily papers and over 2,200 weekly papers. Radio material will be furnished to over 400 radio stations throughout the country.

A new service will provide 200 television farm editors with stories and pictures relating to animal health subjects.

A broadened advertising program in national farm magazines will tell the importance of professional diagnosis and treatment to more than 5,000,000 readers each month.

Associated Veterinary Laboratories will continue distribution of the motion picture Valiant Years for public showings. This dramatic film story of the veterinary profession has already been shown to more than 2,000,000 people in group showings and has been televised over 200 times.

Companies who are members of Associated Veterinary Laboratories, and who share in the cost of the educational campaign are: Allied Laboratories, Inc., Kansas City, Missouri; Blue Cross Serum Co., Superior, Nebraska; Corn Belt Laboratories, Inc., East St. Louis, Illinois; Corn States Laboratories, Inc., Omaha, Nebraska; Fort Dodge Laboratories, Inc., Fort Dodge, Iowa; Grain Belt Supply Co., Omaha, Nebraska; The Gregory Laboratory, Inc., Whitehall, Illinois; Jensen-Salsbery Laboratories, Inc., Kansas City, Missouri; The National Laboratories Corp., Kansas City, Missouri; Norden Laboratories, Lincoln, Nebraska; Pitman-Moore Co., Indianapolis, Indiana; Sioux City Serum Co., Sioux City, Iowa; Sioux Falls Serum Co., Sioux Falls, South Dakota; and The Southwestern Serum Co., Wichita, Kansas.

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Rice hulls are recommended for nest litter for both chickens and turkeys.

Self Feeding for Dogs

Gaines Research Kennels at Kankakee, Illinois, now have two litters of puppies each representing the fifth generation of Labrador Retrievers that have known no other food than the dry Gaines homogenized product, self-fed, for their entire lifetimes.

Results of tests reported indicate that dogs make better use of the food they eat by taking it frequently, in small portions. In this way, the level of nutrients in the blood stream is held more nearly constant. Experience with Great Danes, for example, indicates that dry, self-feeding is by far the preferred method for maintenance of good flesh and condition.

▼ ▼ ▼

Dr. Wayne H. Thompson, Earlville, Iowa, was elected president of the Eastern Iowa Veterinary Association at the organization's 42nd annual meeting at Cedar Rapids on October 15. He has served the group as secretary for the past three years.

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Addition of 20 mg. of vitamin E per lb. to all feed of vegetable origin increased hatchability of turkey eggs from 51.7 to 88%.

Mississippi Experiments Support New Anthelmintic

Trials with the new veterinary drug, piperazine, continue to hold the interest of animal health authorities concerned with reducing the billion-dollar losses attributed to parasites.

The Mississippi Agricultural Experiment Station reports that hogs were cleansed of ascarids and the nodular worm without weight loss or toxic symptoms. They were fed the piperazine compound, parvex,® in three pounds of ground feed. This preparation, the station explains, breaks down in the stomach into piperazine and carbon disulphide, both of which are effective in destroying and expelling worms.

British researchers, reporting in the British Medical Journal, found piperazine effective against the ascarid worms under laboratory conditions. The drug had a narcotic effective on the parasites and paralyzed them on contact.

▼ ▼ ▼

Three most costly respiratory diseases of poultry are chronic respiratory disease (CRD), Newcastle disease (ND) and infectious bronchitis (IB).

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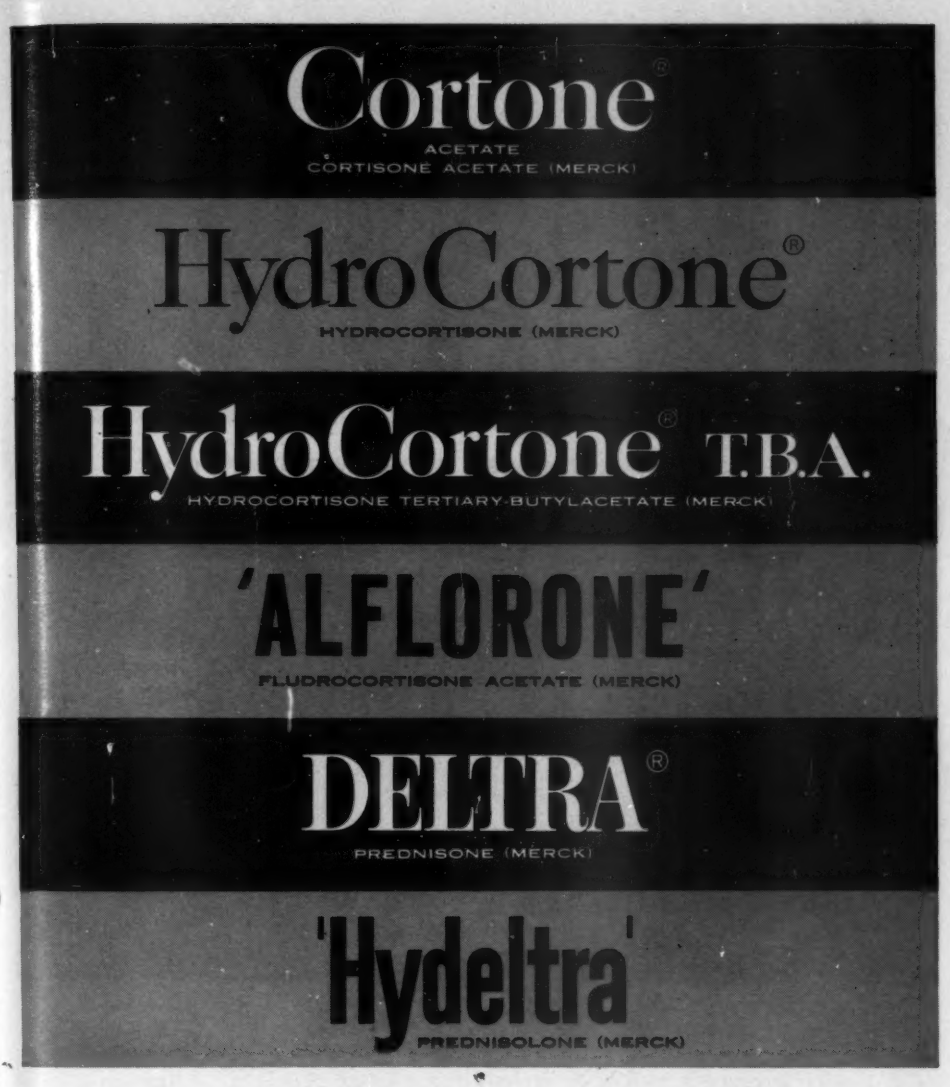

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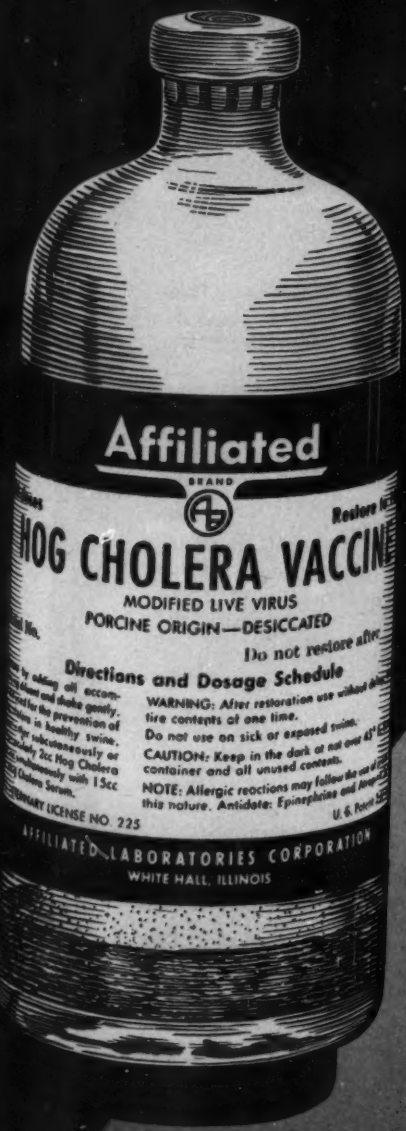
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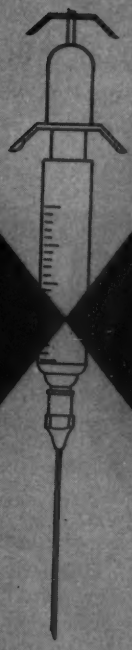

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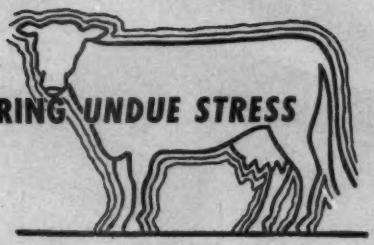

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Primary ketosis of dairy cows (if glucose therapy is utilized)*
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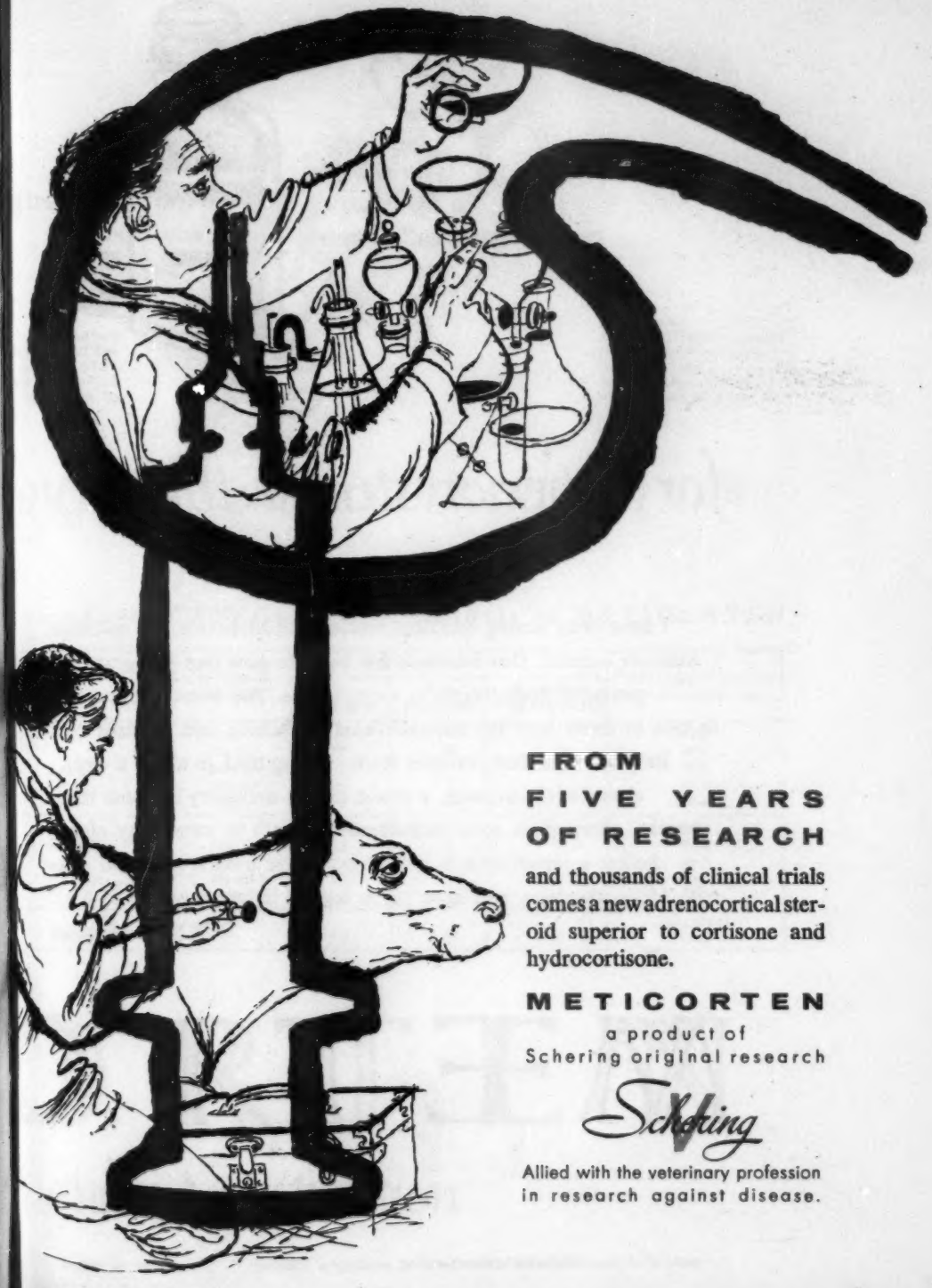

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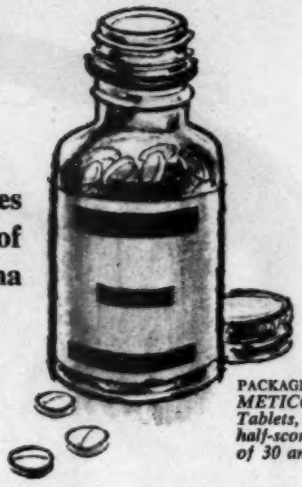
Allied with the veterinary profession in research against disease.

no failures
in 50 cases of
canine "summer" eczema



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"I have been having excellent results with Meticorten in so-called summer eczema. Our rationale has been to give one milligram per pound of body weight in a single dose. The owners report that in one to three days the animals cease scratching and in those that have lost their hair, the hair starts coming back in about a week's time. On the average, a repeat dose is necessary in about three weeks, although in some individuals a month or more may elapse before a repeat dose is necessary. I have treated some 50 dogs with Meticorten now and have yet to have a failure reported to me."
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METICORTEN* *brand of prednisone, Schering.* †*Name on request.*

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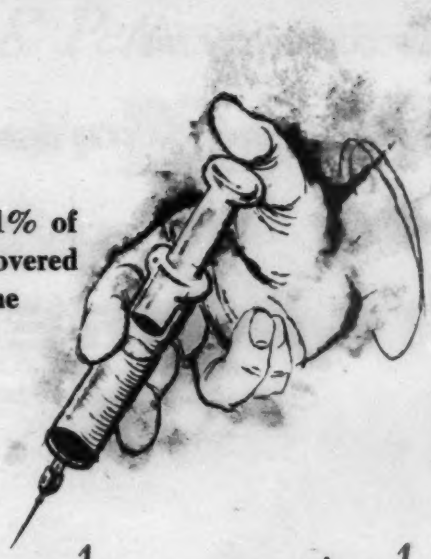

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newest adrenocortical hormone

Response of 300 Cases †† of Ketosis to METICORTEN

	Milligram Dosage	Number of Cases			Percentage Recovery with One Injection
		One Injection	Two Injections	More than Two Injections	
Ketosis	*100*	*19*	*3*	*2*	*79.2*
	150-200	*80*	*18*	*2*	*80.0*
	250-300	*77*	*17*	*6*	*77.0*
	350-400	*43*	*3*	*1*	*91.5*
	500	*2*	*0*	*0*	*100.0*
Ketosis with Complications	*100*	*1*	*0*	*0*	*100.0*
	150-200	*11*	*2*	*0*	*84.6*
	250-300	*6*	*0*	*1*	*85.7*
	350-400	*3*	*0*	*0*	*100.0*
	500	*2*	*1*	*0*	*66.6*
Totals		*244*	*44*	*12*	*(average) 81.3*

CORTEN

aqueous suspension

††*Compilation of Clinical Reports to Schering*

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VARITON® CREAM

2% diphemanil methylsulfate, veterinary, Schering

an unusually effective agent for

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now you can prevent relapses in

in milk fever . . . PARTEROL*

Parterol is an oil-soluble steroid obtained by irradiating ergosterol.

Parterol has specific action on blood calcium. Intramuscular or oral doses produce a rise of calcium in the blood and tissue.

By supplementing the hormone secreted by the parathyroid glands. This calcium-raising action of Parterol is produced by mobilizing calcium stored in the bones and increasing the absorption of calcium from the intestinal tract.

To prevent relapses in milk fever by supplementing the parathyroid hormone during periods of stress on the calcium-regulating mechanisms due to increased demand for calcium at parturition. After treatment with calcium, Parterol should be given at the rate of 10 mg. per cow.

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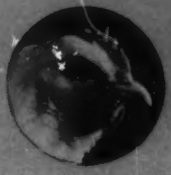
A new and safe anthelmintic



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Can't spread hog cholera
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more and more veterinarians find that the

soothing, protecting healing influence *of*

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5 Gm. of oxytetracycline activity per lb.
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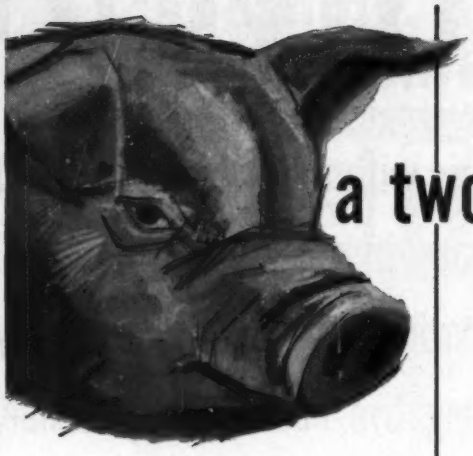

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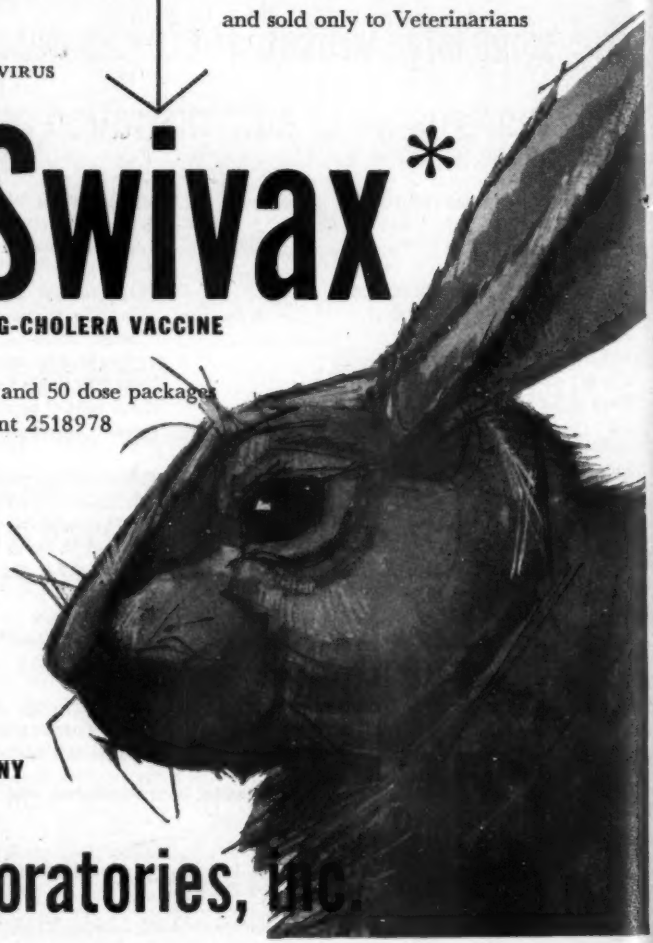

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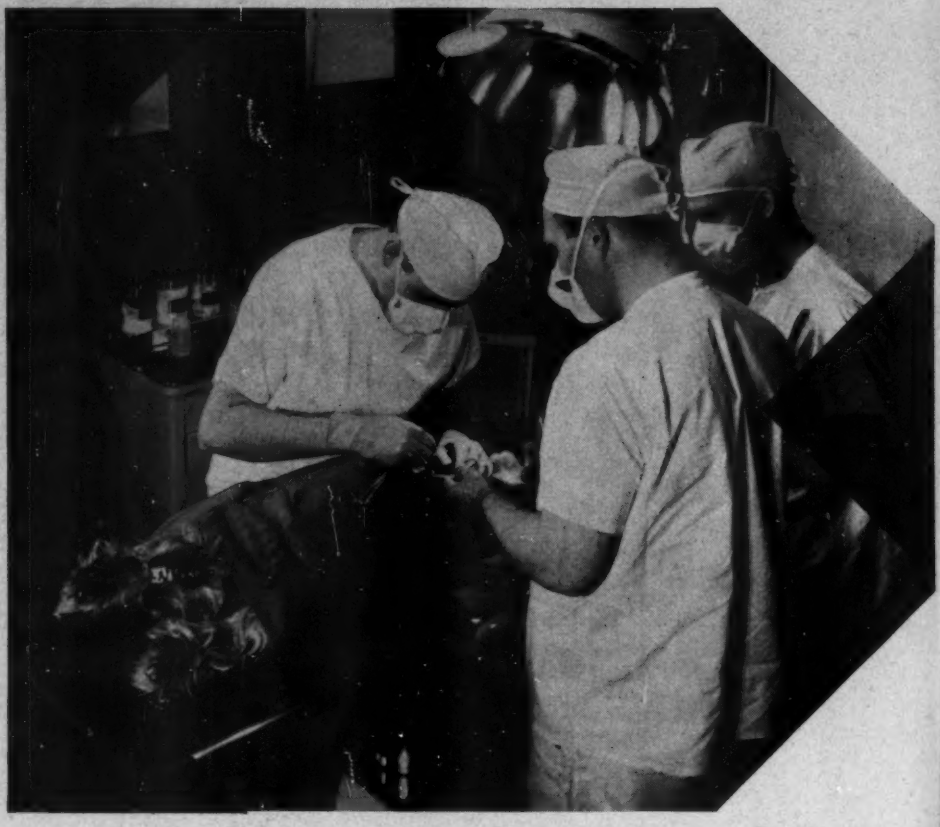

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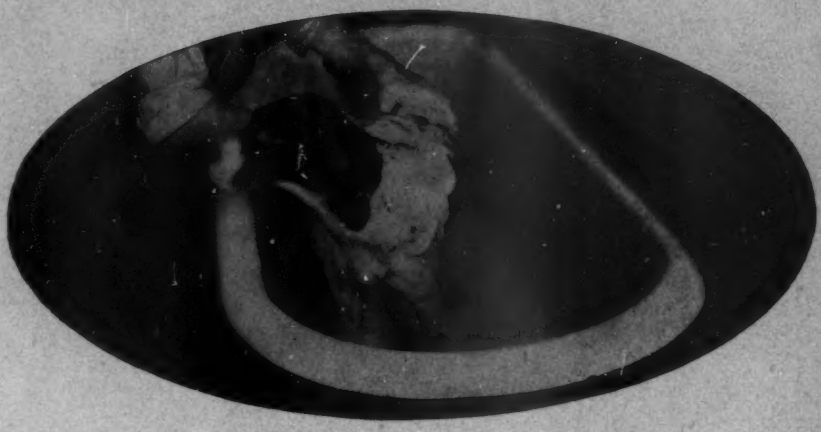

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Detergent, Foaming Base . . . . . q. s.

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To use: wet hair with warm water, then apply sufficient Derisol to make a lather. Work this well into the coat.

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Responsibilities of Citizenship

There is an article on page 433 of the January 29, 1955 issue of the *Journal of the American Medical Association* entitled, The Man Behind the M. D. Degree, that applies equally well to veterinarians and physicians. The article in general discusses the activities in which a physician should participate in community services and efforts. Simply to be an M.D. or a D.V.M. is not enough. If veterinarians do not have the issue of the *Journal* referred to they can at least find it in libraries or in the offices of their local physician.

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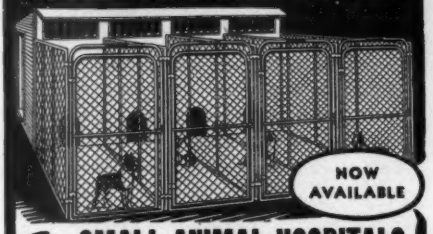

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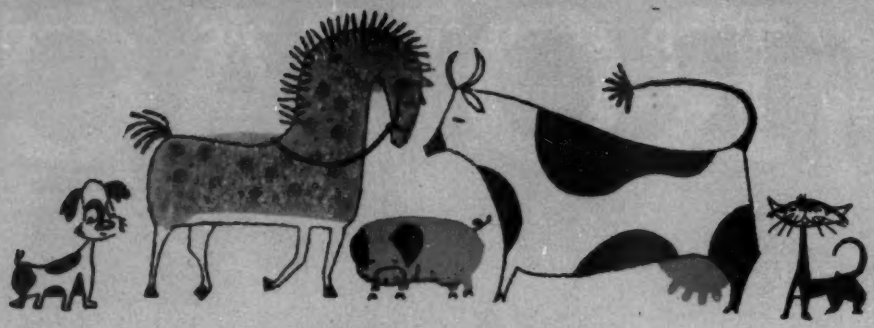

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1. Rachman, M., and Frucht, T. R.: Vet. Med. *49*:341, 1954.
2. Sternfels, M.: Vet. Med. *50*:82, 1955.

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New York Academy of Science Conference

A conference sponsored by the New York Academy of Sciences on Calcium and Phosphorous Metabolism in Man and Animals with Special Reference to Pregnancy and Lactation will take place in New York City on January 10 and 11, 1956. Topics covered will include: Calcium Balance and Turnover Studies, Parathyroid Hormone, Problems of Parturient Paresis in Dairy Cows, Calcium Complexing Agents, and Special Aspects of Calcium Metabolism.

Dr. Franklin C. McLean, University of Chicago, is General Chairman. Participants include: Drs. C. L. Comar, Oak Ridge Institute of Nuclear Studies; Max Kleiber, University of California; Genevieve Stearns, University of Iowa; Felix Bronner, Rockefeller Institute; Roy V. Talmage, Rice Institute; Paul L. Munson, Svein U. Toverud, and Roy O. Greep, Harvard School of Dental Medicine; Gerald M. Ward, Colorado Agricultural and Mechanical College; H. H. Cole and J. M. Boda, University of California; J. W. Hibbs and William Pounden, Ohio Agricultural Experiment Station; T. H. Blosser, State College of Washington; Martin Rubin, Georgetown University; Philip H. Henneman, Evan Calkins, David Kahn, Wilma Canada, John D. Crawford, Allan M. Butler, Harvard Medical School; I. Snapper, Beth-El Hospital; W. D. Malherbe, Onderstepoort, South Africa; Joseph Pincus, Isaac Gittleman and Albert E. Sobel, The Jewish Hospital of Brooklyn; Ann M. Budy and John H. Rust, University of Chicago; Gilbert Forbes, University of Rochester; Philip S. Calcagno, University of Buffalo; and H. H. Dukes, Cornell University. For further information write to Dr. R. R. Marshak, Springfield, Vermont.

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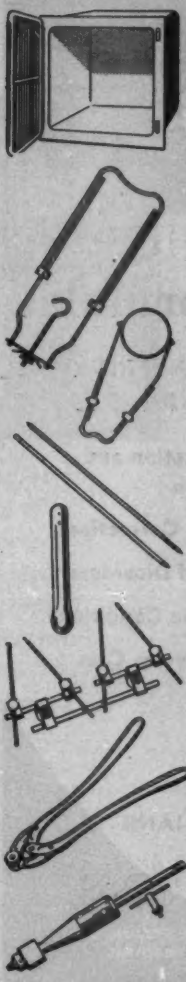

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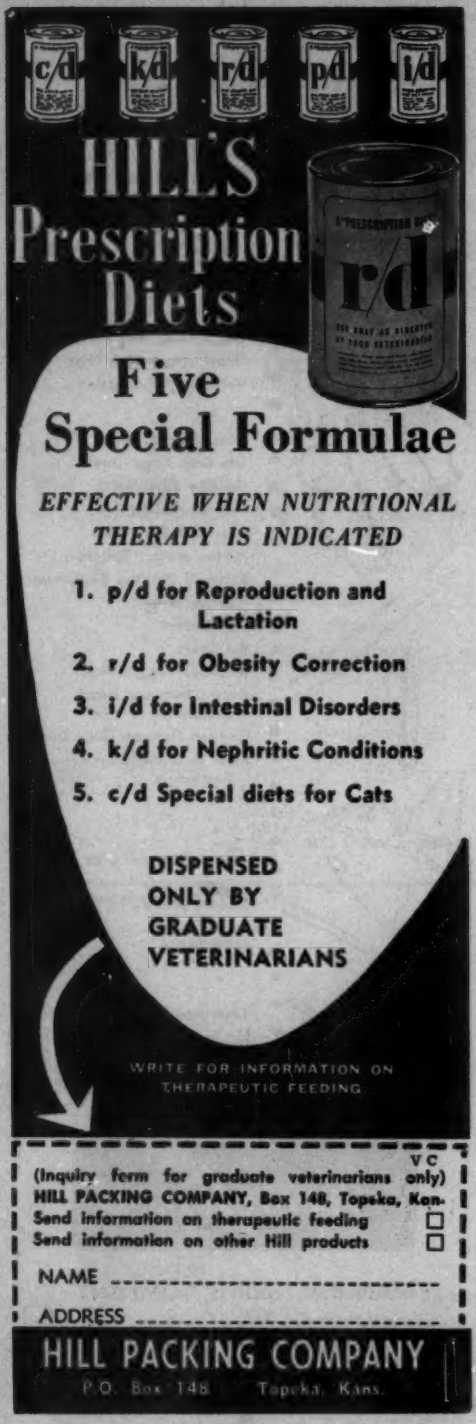

Denny Hammond Udall
1874-1955

Denny H. Udall was born of New England farm folk, at Craftsbury, Vermont, on February 8, 1874, and died at Ithaca, New York, on September 9, 1955. At an early age Doctor Udall had a keen desire for an education and was graduated with the B.S.A. degree from the University of Vermont in 1898. In the fall of that year, he entered Cornell University to study veterinary medicine. The D.V.M. degree was conferred upon him in 1901. As evidence of his application to his work as a veterinary student, D. H. Udall was the "Demonstrator in Anatomy" in 1900-01, his senior year.

After two years (1901-03) in general practice at Saint Johnsbury, Vermont, Doctor Udall was appointed assistant professor of surgery at the Veterinary College at The Ohio State University, in which capacity he served until 1908, when he was called to Cornell as Professor and Head of the Department of Veterinary Medicine. In 1914, he became director of the Ambulatory Clinic. He continued in this dual capacity until his retirement from active administrative work in 1942, when he became Professor Emeritus.

Under Doctor Udall's able leadership for 34 years, the Department of Veterinary Medicine developed rapidly. The Ambulatory Clinic, an integral part of the Department, became the envy of every educator in this field who visited Cornell. Doctor Udall did not subscribe to the modern thesis that eight-o'clock classes and undergraduate teaching are for the young instructors and assistants; he met eight-o'clock classes five days a week, two terms a year. He usually walked to class, was there on time, and always had an acid remark for the sleepy-eyed student who came late. His teaching was characterized by the fact that he led the bright student and incessantly prodded the dullard. Those individuals who were wont to slide along with little effort were frequently the target of his biting sarcasm and often found themselves going home with an armful of reference books so that they would not be caught napping again. While it might be said that Doctor Udall was not particularly close to his students, those who had contact with him respected and honored him. He was absolutely fair and honest. He never hesitated to speak for what he believed to be right, regardless of the consequences.

It is recognized that the Veterinary College at Cornell University enjoys an enviable repu-

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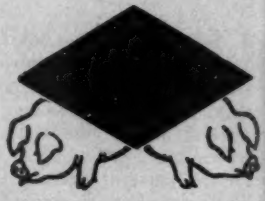

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tation. Frequently it has been said that *The Cornell Veterinarian* has contributed more to that reputation than any other single factor. For thirty years *The Cornell Veterinarian* and Doctor Udall's name were synonymous. When traveling in Europe, he was once introduced to a distinguished veterinarian as the "Head of the Department of Veterinary Medicine at Cornell University." That remark made no impression; but later, when this gentleman was further informed that Doctor Udall was the editor of *The Cornell Veterinarian*, the response was dramatic.

On the first issue of *The Cornell Veterinarian* (June 1911), Doctor Udall was an alumni editor. From 1915 through 1917 he was the publisher, and from 1918 through 1938, the editor and publisher. During that time the publication grew from 97 pages to a 350-page volume. In 1935, Merillat and Campbell in "Veterinary Military History of the United States" stated: "In no other veterinary magazine in this country has the average quality of the articles published been as high as those published in *The Cornell Veterinarian*, nor have the contents of any other American veterinary magazine been so generally abstracted in continental European veterinary literature." Throughout the years, Doctor Udall spent uncounted hours as editor, secretary, business manager, and "news hawk," in the interests of the quarterly.

While active as a writer, being the author of at least sixty-one scientific papers and books, his greatest contribution to veterinary medicine may very well have been "The Practice of Veterinary Medicine," the first edition of which appeared in 1933 and which is in its sixth revised edition (1954). Typical of the author's thinking, the book is complete, exact, and free from superfluous or extraneous material.

Doctor Udall was proud of his military record. He was a private in the First Vermont Volunteers of the Spanish-American War. During World War I he was a Major, Veterinary Corps; Division Veterinarian of the 86th Division; Commander, Veterinary Hospitals Nos. 7 and 18 in France. He was a teacher of the American Expeditionary Forces at the University of Beaune in France. Those who served under him in France were quick to point out the thoroughness and vigor with which he dispatched his duties. He never compromised with the truth or with efficiency.

Whether or not they know it, large animal practitioners had an able champion in the person of Doctor Udall. He fought long, hard, and successfully to give the general practitioners a place in the eradication program of infectious diseases — particularly tuberculosis and brucellosis. There were some who would have placed these programs entirely in the hands of regulatory officials, but were unsuccessful so long as Doctor Udall lived to oppose them. Time has vindicated his conviction. Earlier he had pioneered in research on the clinical diagnosis of open cases of bovine tuberculosis. In later years, when the attention of the profession was focused on the control of mastitis, some believed that control could be effective only in the hands of a corps of technicians with a well-equipped laboratory. Doc-

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tor Udall believed that the disease could be diagnosed, controlled, and treated in the barn by the practicing veterinarian. Time and again those beliefs have been justified. Today any system of control of disease is based upon the fundamental work done by him 20 to 25 years ago.

In 1937, he was the first recipient of the XII International Veterinary Congress Award, given to the veterinarian whose work was most outstanding and noteworthy during the year. In addition to his earlier collegiate degrees, Doctor Udall received in 1938 the honorary degree of Doctor of Science from the University of Vermont. He was a member of the Southern Tier Veterinary Medical Society, the New York State Veterinary Medical Society, the New York State Veterinary Medical Society (a past president), the American Veterinary Medical Association, Phi Kappa Phi, Sigma Xi, Phi Zeta, Alpha Psi, Sigma Nu, and the Congregational Church.

He is survived by his wife, Mary Taylor Udall, and by three children, all graduates of Cornell University, Mrs. James Earl Ash of Bethesda, Maryland, John Taylor Udall of Ithaca, and Dr. Robert Hovey Udall of Fort Collins, Colorado, and two grandchildren.

Doctor Udall's tenacity of purpose, his straightforwardness and diligence have blazoned in the history of veterinary medicine an epoch that will be long remembered. His colleagues and former students will not soon forget the forceful man who met his appointments, worked hard and long each day, and expected others to do the same.—*A. G. Danks, S. J. Roberts,* and *M. G. Fincher, Ithaca, N. Y.*

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MEETING CALENDAR

Animal Care Panel. Annual meeting. Henry Hudson Hotel, New York, N. Y., December 1-2, 1955. Robert J. Flynn, P. O. Box 299, Lemont, Illinois, secretary.

Arizona Veterinary Medical Association. Winter meeting. Chandler, Ariz., December 2-3, 1955. George S. Calderwood, 926 Apache Blvd., Tempe, secretary.

Kentucky Veterinary Medical Association. Ken-Lake Hotel, Hardin, Ky., December 5-6, 1955. Robert H. Singer, 136 Shawnee Place, Lexington, secretary.

Pennsylvania University Annual Conference for Veterinarians. University of Pennsylvania, School of Veterinary Medicine, Philadelphia, Pa., January 3-4,

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Cornell University Conference for Veterinarians. Annual. New York State Veterinary College, Ithaca, N. Y., January 4-6, 1956. W. A. Hagan, dean, Cornell University, Ithaca.

Oklahoma Veterinary Medical Association. Annual meeting. Hotel Mayo, Tulsa, Okla., January 8-10, 1956. C. H. Faulks, 3421 N.W. 20th St., Oklahoma City, secretary.

Indiana Veterinary Medical Association. Annual meeting. Hotel Severin, Indianapolis, Ind., January 11-13, 1956. L. M. Borst, 3315 Shelby St., Indianapolis, secretary.

Wisconsin Veterinary Medical Association. Annual meeting. Schroeder Hotel, Milwaukee, Wis., January 11-13, 1956. B. A. Beach, 1215 Vilas Ave., Madison, secretary.

Intermountain Veterinary Medical Association. Annual meeting. Hotel Utah, Salt Lake City, Utah, January 16-18, 1956. Edward A. Tugaw, 3015 South State St., Salt Lake City, secretary.

Iowa Veterinary Medical Association. Annual meeting. Hotel Ft. Des Moines, Des Moines, Ia., January 17-19, 1956. F. B. Young, Waukee, secretary.

Michigan State University Postgraduate Conference for Veterinarians. Michigan State University College of Veterinary Medicine, January 18-19, 1956. C. F. Clark, East Lansing, dean.

Virginia Veterinary Medical Association. Annual meeting. Hotel John Marshall, Richmond, Va., January 22-24, 1956. Wilson B. Bell, 210 Clay St., Blacksburg, secretary.

California State Veterinary Medical Association. Mid-winter conference. School of Veterinary Medicine, University of California, Davis, January 23-25, 1956. Charles S. Travers, 3004 16th St., San Francisco, executive secretary.

North Carolina State College Annual Conference for Veterinarians. North Carolina State College, Raleigh, N. C., January 24-27, 1956. C. D. Grinnells, State College Station, Raleigh, chairman.

Maryland State Veterinary Medical Association. Winter meeting. Lord Baltimore Hotel, Baltimore, Md., January 26-27, 1956. John D. Gadd, Cockeysville, secretary.

Louisiana State University Annual Conference for Veterinarians. Louisiana State University, Baton Rouge, La., January 31-February 1, 1956. W. T. Oglesby, Department of Veterinary Science, Louisiana State University.

Kansas Veterinary Medical Association. Annual meeting. Baker Hotel, Hutchinson, Kan., February 5-7, 1956. K. Maynard Curts, 70 Central Ave., Kansas City, Kan., secretary.

Texas Veterinary Medical Association. Annual meeting. Mineral Wells, Tex., February 5-7, 1956. Paul B. Blunt, 710 Maverick Bldg., San Antonio, secretary.

Illinois State Veterinary Medical Association. Annual meeting. Hotel LaSalle, Chicago, Ill., February 20-22, 1956. C. B. Hostetler, 1385 Whitcomb Ave., Des Plaines, secretary.

Colorado A. & M. Annual Conference for Veterinarians. Glover Veterinary Hospital, School of Veterinary Medicine, Colorado A. & M. College, Ft. Collins, Feb. 20-26, 1956. O. R. Adams, head Veterinary Clinics and Surgery, chairman.

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C. Theodore Beechwood, Washington, D. C., UP '18, Aug. 23, 1955.

James J. Black, Vineland, N. J., KSC '23, Sept. 1, 1955.

R. D. Boast, Winnepeg, Man., OVC '11, July 19, 1955.

John F. D. Bowersox, Stoystown, Pa., OVC '07, July 10, 1955.

Solomon V. Brown, Barnwell, S. D., CVC, July 22, 1955.

LaRue E. Davis, Martinsville, Ind., IND '11, July 12, 1955.

William H. Dean, Carrier Mills, Ill., MCK '18, July 19, 1955.

William E. Dodsworth, San Benito, Tex., COLO '15, July 8, 1955.

George J. Gruenewald, Maplewood, N. J., MCK '14, Aug. 28, 1955.

Jay MacDonald, Jamaica, N. Y., OVC '07, July 17, 1955.

H. Meade Hamilton, Munice, Ind., IND '09, Sept. 12, 1955.

Harvey E. Horel, Augusta, Wis., CVC '11, July 28, 1955.

George E. Kinemond, Philadelphia, Pa., UP '26, Sept. 1955.

John R. Stifler, Danville, Ky., USC '11, Aug. 30, 1955.

Percy R. Talbot, Edmonton, Alta., ONT '07, July 31, 1955.

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1. Frederickson, L. E.; Willett, J. C.; Smith, J. E., and Price, E. R.: Metropolitan rabies epizootic controlled by vaccination. Vet. Med. 48 (1953) 278-279, 288.

(from The North American Veterinarian, Nov. 1953)

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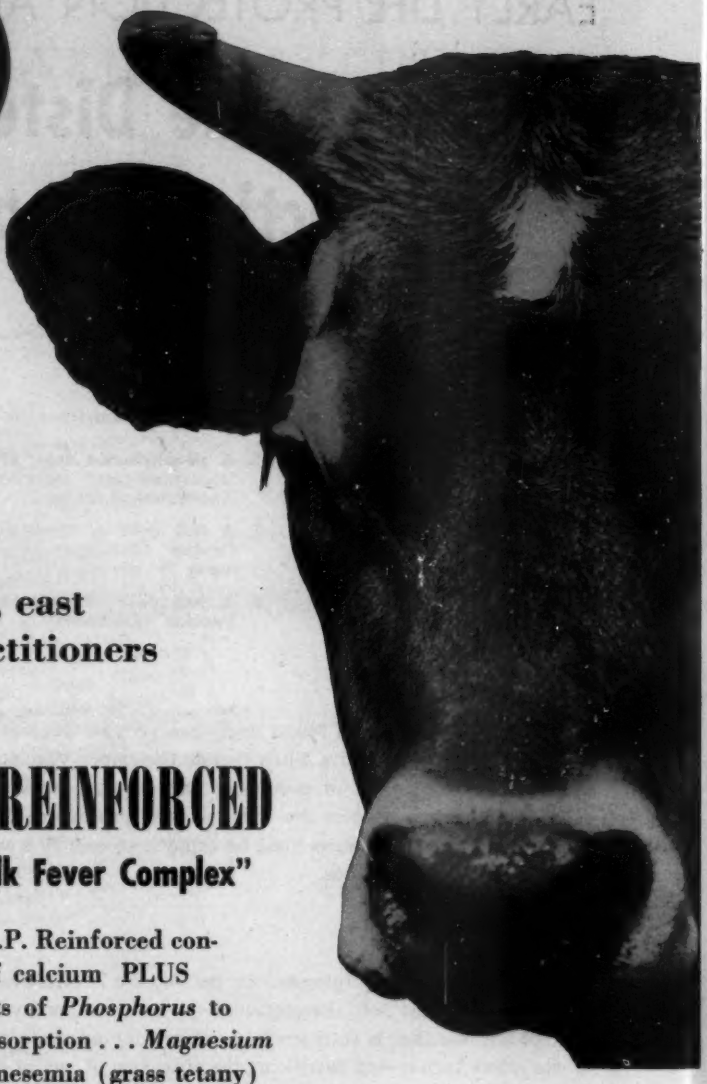

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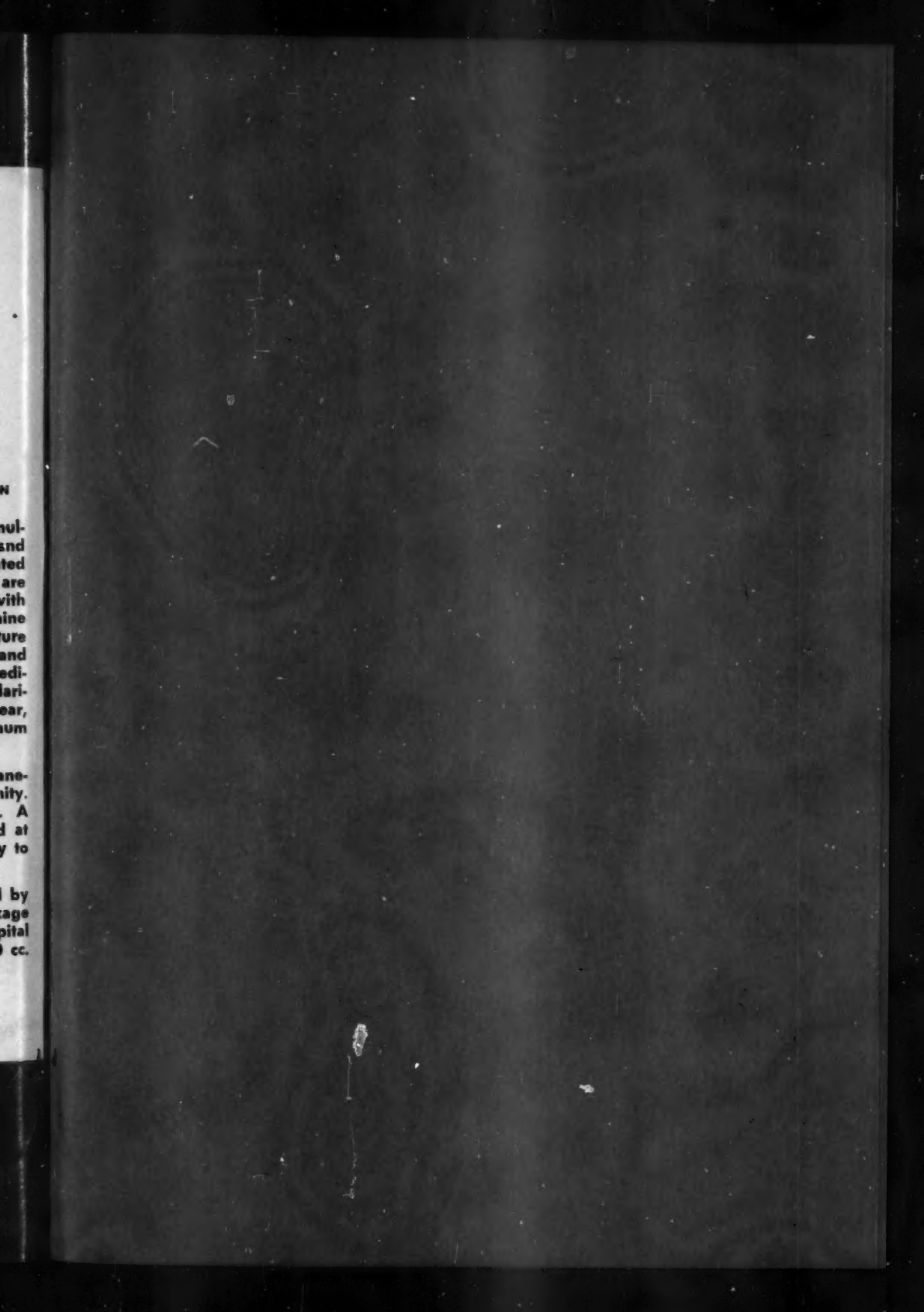
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